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ABSTRACT

This report summarizes findings from a survey of 183 of the 314 elementary, middle, and high school educators that participated in the pilot year implementation of the Rhode Island Teacher Training Initiative (RITTI). All RITTI educators received 60 hours of training over a 2-week period focused on using a variety of software applications, Internet tools, and various Internet search engines. Participants were asked to bring an instructional unit of practice to the training. The goal of this process was to give teachers hands-on experience in how to incorporate technology into existing curriculum units. Respondents to this survey reported dramatic increases in their confidence with and ability to use a variety of software applications and resources as a result of their participation in RITTI. (ASK)

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Rhode Island Teachers and Technology Initiative

Findings from the Pilot Implementation Year

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Rhode Island Teachers and Technology Initiative

Findings from the
Pilot Implementation Year

EDC Center for Children & Technology
July, 1998

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With assistance from:
Rhode Island Foundation
University of Rhode Island
Rhode Island State Department of Education

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TABLE OF CONTENTS

Executive Summary 5

Introduction 7

Profile of Respondents' Schools 11

Profile of Respondents 13

Respondents' Technology Background and Training 16

Classroom Practices 22

Impact on Student Learning 28

Rhode Island Teachers and Technology Initiative 32

Barriers to Effective Use of Technology 37

Technology Infrastructure in Respondents' Schools 39

Conclusion 43

References 45

Acknowledgments 46

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EXECUTIVE SUMMARY

This report summarizes findings from a survey of 183 of the 314 elementary, middle, and high school educators who participated in the pilot year implementation of the Rhode Island Teacher Training Initiative (RITTI). All of the educators who responded to the survey did so voluntarily, at the end of a daylong training conference held at the University of Rhode Island in May 1998.

Findings

- The educators represented in this survey are highly educated and very experienced. Nearly 80% of the respondents have earned at least a master's degree, and almost half have taught for twenty years or more.

- Respondents to this survey report dramatic increases in their confidence with and ability to use a variety of software applications and resources since their participation in RITTI. Nearly all respondents moderately (30.9%) to strongly (67.4%) agree that they now have more confidence in their own capabilities to use technology. Since participating in RITTI the percentage of teachers who report a medium to high ability to word process jumped from 43.9% to 98.9%.

- These teachers spend significant amounts of time (an average of 13.7 hours per week) using technology; two-thirds of the time spent online occurs at home. The data suggest that this time is spent primarily on curricular and professional development activities rather than direct classroom instruction with students.

- The most highly rated incentives for using computers and the Internet with students include preparing students for life in an increasingly technological society and ensuring that all students have opportunities to gain access to technology resources. This concern on the part of the teachers is also reflected in the barriers to successful technology integration that they identified; 75% of respondents strongly agree that there are not yet enough computers connected to the Internet in their schools.

- Respondents report substantial changes in their professional outlook and in their interactions with students and colleagues. Two-thirds of these teachers report that, since RITTI began, they have become more reflective about their teaching practices. In addition, 58.7% say they are now more likely to act as coach or adviser to their students, and 52.3% report that they are spending more time working with other teachers on curricular and instructional planning.

- It is evident that teachers involved in RITTI are having an impact on decision-making processes related to technology in their schools and districts. Among the most striking changes are an increase in collegial support among teachers; the development of models for integrating computers into the curriculum; and the review, selection, and purchase of hardware or software products. In addition, respondents report increased involvement in the development of school and district-wide policies for computer and Internet use.

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INTRODUCTION

WE BELIEVE IN TEACHERS *as a critical catalyst for school reform. Not reform in a way most people think about it—restructuring funding formulas or breaking the death-grip of age grouping or the 180-day school year. Our focus is on the type of reform that matters most, today, to the overwhelming majority of children and their families: helping all children learn better.*

Ronald V. Gallo &
Ronald Thorpe
Providence Journal,
April 8, 1997

Background

The Rhode Island Teachers and Technology Initiative (RITTI) is a $5 million, four-year effort sponsored by the Rhode Island Foundation. Over a four-year period the project is supplying training and laptop computers to approximately 3,000 public school teachers in the state of Rhode Island. RITTI is a collaboration among the Rhode Island Foundation, the Rhode Island Department of Education (RIDE), and the University of Rhode Island's School of Education. The state's teachers' unions, the governor's office, and the State Assembly serve as important RITTI advocates; the Microsoft Corporation is a significant partner, contributing $1.5 million worth of software applications during the first year alone.

The premise of the Rhode Island Foundation is that "school reform lives or dies at the juncture between a student and a teacher" (*Providence Journal*, April 8, 1997). Believing that teachers are a critical catalyst for enabling innovative reforms to unfold in our nation's schools, the Foundation designed this project to make it possible for individual teachers to:

- Create technology-based curricula
- Increase and broaden their network of professional and collegial connections
- Enhance their personal and professional productivity with state-of-the-art technology tools.

Placing teachers at the center of a statewide effort reflects the Foundation's definitive commitment to the innovative potential of individual educators.

This initiative builds substantially on the work of the U.S. West/NEA Teacher Network program of the U.S. West Foundation's Widening Our World initiative and shares certain similarities with other educational laptop programs, such as the pilot laptop program sponsored jointly by Microsoft Corporation and Toshiba America. Several important features of RITTI, however, distinguish it from these other efforts. First and foremost is the project's commitment to teachers. While many national technology initiatives expend resources to support teachers' professional development, most do not explicitly place teachers at the forefront of educational innovation. RITTI believes that teachers know best and, when appropriately supported, can serve as a critical force in promoting substantive change at the school and district level.

Second, this project is a statewide initiative in our nation's smallest state. There are 327 public schools in the state of Rhode Island (RIDE, 1998 Statewide Analysis) and approximately 9,200 teachers (NCES, 1995, p. 78, Table 67). During the pilot year (1997–98) RITTI attracted one teacher from almost every school in the state. By the end of the fourth year, RITTI will have worked directly with nearly 30% of all public school teachers in the state. The potential for impact is enormous.

Third, this initiative has harnessed the resources of three of the state's most influential institutions and obtained additional support from both state teachers' unions, the State Assembly, and the governor's office. The Rhode Island Foundation, the State Department of Education, and the University of Rhode Island are united by a common vision and shared sense of purpose—to use RITTI as a catalyst for helping all children in the state to learn better. The Rhode Island Foundation believes that improving the state's public schools is one of their most important mandates. The Foundation has supplied more than just resources: it has provided leadership and a commitment to championing the good work of each and every RITTI participant. The School of Education at the University of Rhode Island is the state's largest teacher-training institution. It has coordinated the training and ongoing technical and professional support of RITTI teachers, sponsored and maintained the RITTI listserv and Website, and managed repairs and replacement machines to ensure that participants always have a working

computer. The State Department of Education has played a critical role in helping to connect RITTI to other technology-based programmatic efforts, including $75,000 in mini-grants offered to schools to pursue technology projects, $3.4 million for additional technology awarded by the State Assembly, and $500,000 from the governor's budget for school-based technology initiatives. The State Education Department has also made it possible for schools to pay substitute teachers while RITTI participants attend midyear professional development efforts.

The commitment of these three institutions to working together is evidenced most clearly in the management structure of the project. The program has no single Executive Director, but is managed through a three-person team of Ted Kellogg (University of Rhode Island), Bill Fiske (Rhode Island Department of Education), and Ron Thorpe (Rhode Island Foundation).

Selecting and Supporting the RITTI Participants

The RITTI project team worked with the two state teachers' unions to disseminate information about the project and mail applications to all teachers in the state. Approximately twelve hundred teachers applied to be part of the RITTI pilot. Applications were reviewed by the Rhode Island Foundation staff and representatives of the teachers' unions. Three hundred and fourteen educators were selected to participate in RITTI. Teachers could choose either a PC or a Macintosh. (The PC machines were Toshiba Satellite Pro 430cdt's, the Macintosh machines were 1400cs's.) Two-thirds of the participants chose the PC, the remainder, the Macintosh.

All RITTI educators received 60 hours of training over a two-week period during the summer of 1997. The trainers were selected from participants in the Rhode Island Department of Education's Project SMART. This National Science Foundation–supported initiative had trained a cohort of Rhode Island educators in the use of math, science, and technology resources. The RITTI training focused on helping participants learn to use a variety of software applications (e.g., Microsoft Office), Internet tools such as Web browsers and email programs (e.g., Eudora), and various Internet search engines. Each teacher was required to bring an instructional unit of practice to the training. A key component of the training centered on helping teachers integrate technology into this lesson. The goal of this process was to give teachers hands-on experience in how to incorporate technology into existing curriculum units and to provide them with an activity they could use with their students in their own classrooms. All of these lessons were subsequently made available on the RITTI Website (http://www.ed.uri.edu/rif/).

Evaluating the RITTI Pilot

In January 1998 the Education Development Center's Center for Children and Technology (CCT) was asked by the Foundation to conduct an evaluation of the first-year pilot. We decided to conduct a survey study to help develop a systematic profile of the range of activities currently being undertaken by RITTI participants.

Our goal was to develop a survey instrument that would adequately capture the array of practices in which RITTI educators engage. We were also interested in participants' perceptions of the benefits and obstacles to using computers and telecommunications as a professional resource and learning tool. We worked with the Rhode Island Foundation and the University to put together a series of three focus groups, held in different regions and involving teachers at all grade levels, from communities ranging from rural to urban. Approximately 35 teachers participated in these sessions.

The focus groups addressed a range of topics that we wanted to cover in the survey. We asked participants what kinds of technology-based skills and practices they

8

brought to RITTI and how they perceived the program to be affecting their teaching and their students' learning. We asked about the school contexts they were working in and how their involvement with RITTI influenced their local technology agenda. We discussed the factors that are making this laptop project work effectively for them as well as barriers that prevent more effective use of the technology and project resources.

Out of these discussions we developed a questionnaire to investigate the following issues:

- Who are RITTI educators? What kinds of schools are they working in, and what grade levels and subject areas do they teach?
- What is their experience and training in computer-based and telecommunications technology?
- What kinds of classroom-based technology activities are participants engaged in, and what are the effects of these activities on classroom practices and teaching strategies?
- What are the perceived effects of technology activities on students' learning, motivation, and work habits?
- What motivated teachers' involvement in RITTI, and how has their participation influenced their role in their school community, their perceptions of their technical capabilities and skills, and their commitment to their professional work?
- What are the barriers to the effective use of computers and telecommunications technologies in RITTI participants' schools?
- What does the technical infrastructure look like at RITTI participants' schools, and what has motivated the development of the schools' technology initiatives?

In addition to developing questions based on the focus group data, when appropriate we elected to use questions developed for other major educational computing and telecommunications initiatives. The survey borrows heavily from the work of Henry Becker and Jason Ravitz in connection with the National Science Foundation (NSF)–sponsored National School Testbed project (NSF Contract #RED-9454769) and survey questions developed for CCT's NSF-funded Union City Online project (Grant #REC-955-4327). While this report does not compare RITTI findings with those of the other projects, it is our intention to undertake a comparative analysis at a later date.

Survey Respondents

CCT staff administered the survey at a one-day conference that RITTI participants attended at the University of Rhode Island, on May 15, 1998. The Foundation and University of Rhode Island coordinators set aside an hour for participants to complete the questionnaires. A total of 183 participants filled out the surveys, representing 58% of all RITTI participants. In order to ensure respondents' anonymity we did not ask teachers to identify themselves by school. However, since one educator per school participated in the RITTI pilot, no individual school is overrepresented within the data. It is important to note that these data are self-reported by respondents and may not be entirely accurate representations of school demographics or school technology infrastructures.

Interpreting the Findings

This report summarizes all the major findings from the survey. Where appropriate we have compared RITTI respondents and the data they report on their school communi-

9

ties and school technology infrastructures with data collected by the National Center for Education Statistics.

It is the hope of the Center for Children and Technology that the data presented here will be useful to RITTI participants, educators in the state of Rhode Island, and the national community of practitioners and researchers interested in the relationship between technology and school reform.

RITTI teachers say:

The training was very effective because it was geared to the classroom.

The technology helps to change your ways of thinking.

I knew more than I thought I did when I was done with the training.

We are isolated in our classrooms and having the computers is like having a place to connect.

10

PROFILE OF RESPONDENTS' SCHOOLS

To understand how the educators participating in the Rhode Island Teachers and Technology Initiative (RITTI) are similar to and different from teachers nationwide, we compared this group to national averages collected by the National Center for Education Statistics.

RITTI participants are somewhat more likely to be teaching in small schools or in large schools than is true of teachers nationwide. Half of the RITTI participants are working in small schools (fewer than 400 students). A quarter are teaching in medium-size schools (400-799) and a quarter in large schools (800+) (see Figure 1).

When compared to national averages RITTI participants are more likely to be teaching in schools they describe as either urban or suburban, and less likely to be teaching in rural settings (see Figure 2).

Given that the participants in the RITTI pilot program were drawn from nearly all of the 327 schools within the state, it is not surprising that the subsample of survey respondents is teaching in schools that reflect student demographics statewide. In general, Rhode Island has a higher percentage of Caucasian students and a lower percentage of African-American students than is true nationwide. The percentage of students receiving free or reduced-price lunch in the RITTI sample is comparable to the national average (see Figures 3 & 4).

- **Rhode Island schools differ from national trends in several respects:**
  - **Rhode Island has fewer medium-size schools (400-799 students).**
  - **Rhode Island has fewer rural schools.**
  - **Rhode Island has more Caucasian and fewer African-American students.**
- **RITTI participants' schools are not more affluent than schools nationwide.**

Figure 1
School Size

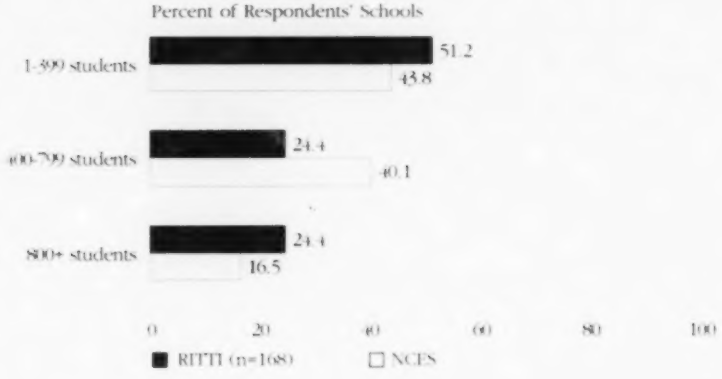
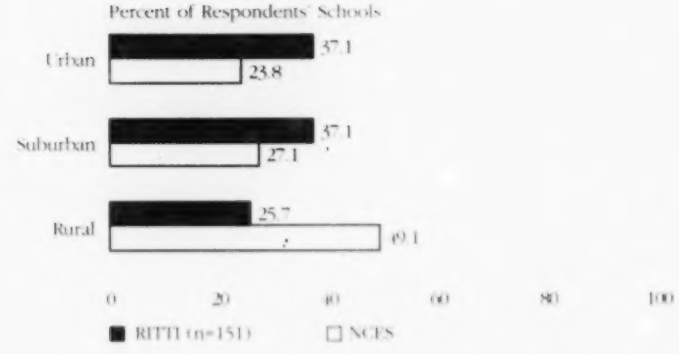


Figure 2
Type of Community



11

Sources

Figure 1
RITTI question 47; NCES (1995), p.104, Table 94.

Figure 2
RITTI question 53; NCES (1993-94), p.22, Table 2.1.

Figure 3
RITTI question 48; NCES (1995), p.60, Table 44.

Figure 4
RITTI question 49; NCES (1995), p. 398, Table 365.

Figure 3
Students' Ethnicity

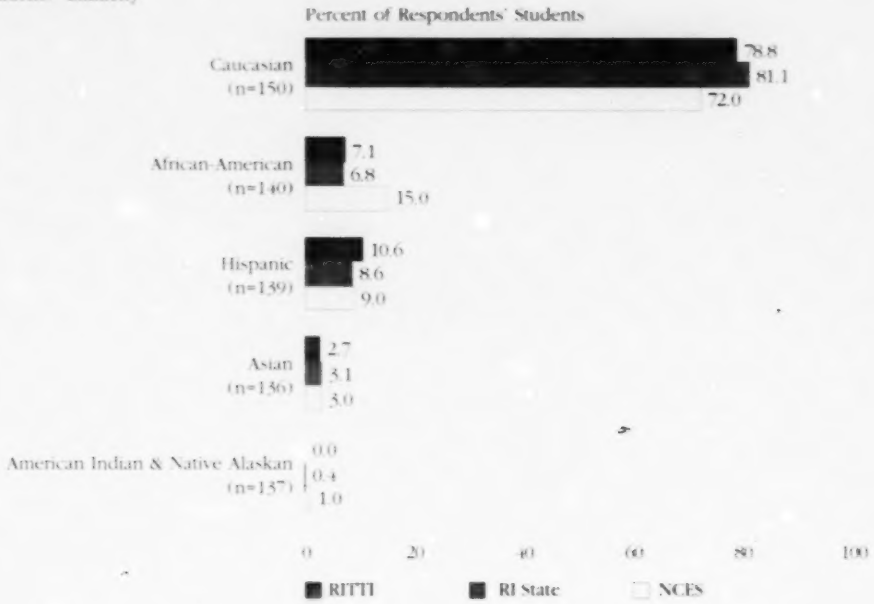
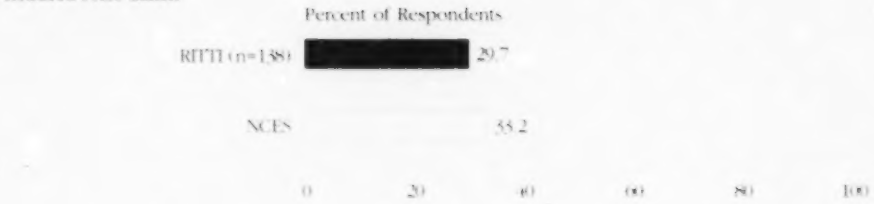


Figure 4
Students Receiving Free or Reduced Price Lunch



12

PROFILE OF RESPONDENTS

Compared to teachers nationwide, RITTI educators tend to be an older, experienced, highly educated, and ethnically homogeneous group. Forty-two percent of RITTI participants are aged 50 or older in contrast with only 13.2% of teachers nationwide (see Figure 5).

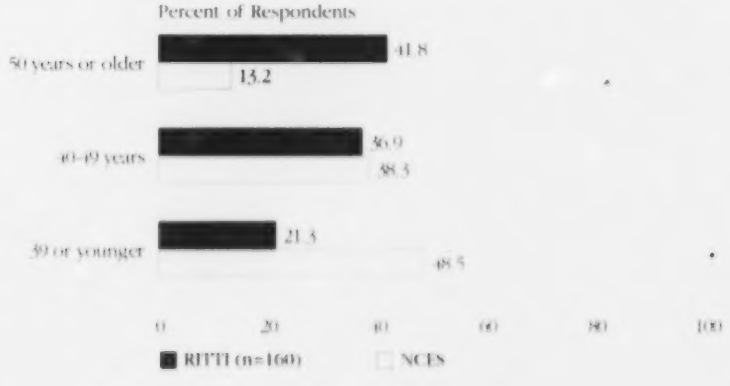
When compared to national averages the RITTI teachers are very experienced educators. Almost half have been teaching for over 20 years. This is slightly higher than state data (42.3%) but significantly higher than national figures (29%). A third of the RITTI teachers have taught for 10-20 years, and almost a fifth for 1-9 years (see Figure 6).

RITTI participants are also highly educated. The majority (79%) have earned at least a master's degree, compared with 59% of teachers statewide and 47.3% of teachers nationally (see Figure 7). The RITTI teacher population is largely Caucasian (98.2%) (see Figure 8). There are also more female teachers in RITTI (90.4%) than there are nationwide (72.8%) (see Figure 9).

RITTI teachers work with students spanning the K-12 age groups. Approximately half teach in self-contained classrooms at the elementary level, compared with only 34.1% nationwide. English/language arts represent the largest content-specific discipline for these educators (8.8%). This is followed by teachers of special education (7.3%), mathematics/computer science teachers (6.7%), other areas (6.2%), and the sciences (4.0%). Library/media specialists constitute 3.9% of RITTI participants, a field for which national data are not available. It is likely that in the national data those educators who describe themselves as library/media specialists are included with "other," accounting in part for the discrepancy between RITTI educators (6.2%) and teachers nationwide (14.9%) who report that their primary teaching position falls into none of the categories listed. The remaining RITTI participants work primarily in the fields of bilingual/ESL education (2.2%), vocational education (1.8%), performing arts instruction (1.7%), foreign language instruction (1.7%), basic skills/remedial education (1.7%), and social studies (1.2%) (see Figure 10).

- **RITTI participants are experienced and highly educated teachers.**
- **They are significantly older than teachers nationwide, and almost entirely Caucasian.**
- **When compared to national demographics, there are many more female teachers and many fewer male teachers participating in RITTI.**
- **Half of the RITTI educators teach at the elementary level; the other half are distributed across middle and high school grades and are teaching in all major subject areas.**

Figure 5
Age of Teachers



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Sources

Figure 5
RITTI question 64a; NCES (1995), p. 77, Table 66.

Figure 6
RITTI question 2; NCES (1995), p.78, Table 67.

Figure 7
RITTI question 5; NCES (1995), p.78, Table 67.

Figure 8
RITTI question 65; NCES (1995), p.77, Table 66.

Figure 9
RITTI question 64b; NCES (1995), p.77, Table 66.

Figure 10
RITTI question 4

Figure 6
Years Working as Teachers

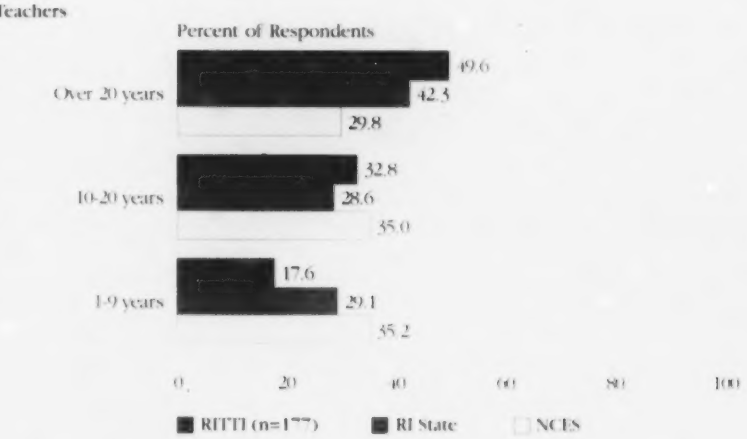


Figure 7
Highest Degree Earned

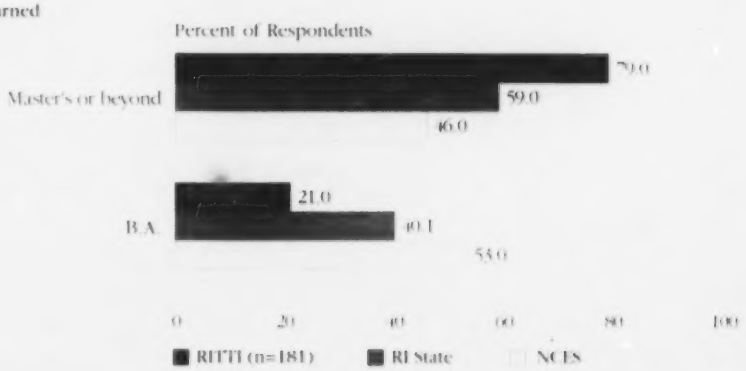


Figure 8
Teachers' Ethnicity

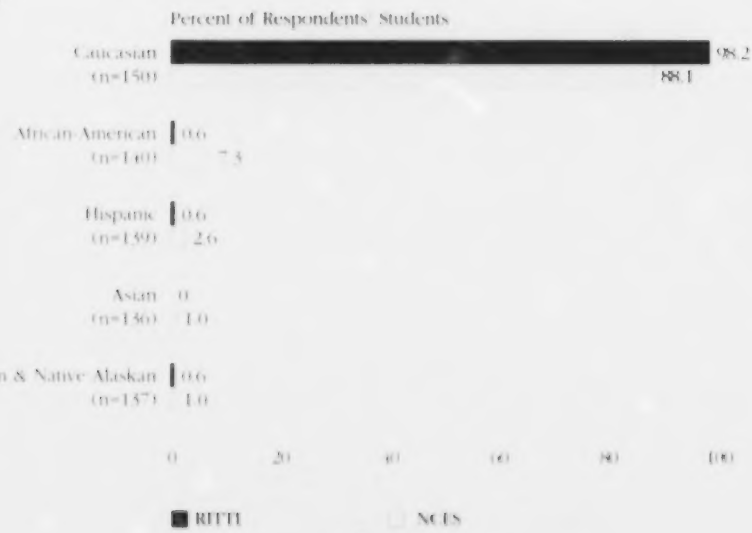


Figure 9
Teachers' Gender

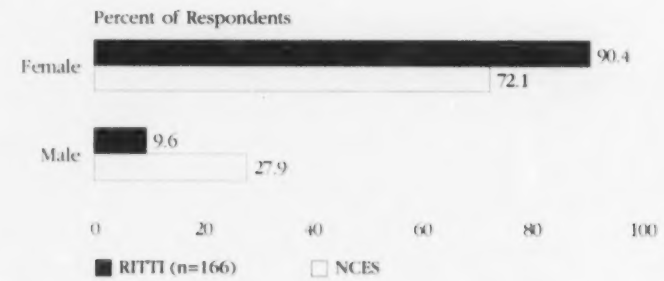


Figure 10
Primary Teaching Assignment

I feel the R.I. initiative has done a super job in providing teachers with an opportunity to be trained and learn how to integrate technology in the classroom.

15

RESPONDENTS' TECHNOLOGY BACKGROUND AND TRAINING

- Veteran, novice, and new users each constitute a third of the sample.
- Veteran technology users are more likely to use computers on a regular basis with their students than are novice or new users.
- RITTI teachers have been using stand-alone computer applications longer than telecommunications tools.
- They are investing a substantial amount of personal time in using their laptop computers.
- This is a highly motivated group of educators. The majority are self-taught and are taking advantage of a wide range of formal and informal training opportunities.

When examining RITTI participants' personal experience (i.e., not for direct instruction with students) in using computers, the sample is distributed fairly evenly across three groups. Over a third of the respondents (36.7%) are veteran users; they report having worked with technology nearly every day for the last 3-10 years. Novice users make up 30% of participants, having used technology regularly during the last 1-2 years. New users constitute close to a quarter of the sample (22.8%). All but 10% of RITTI educators use computers every day. These data suggest that nearly a quarter of all RITTI participants are new technology users and because of their involvement in RITTI have succeeded in integrating computer use into their daily routines (see Figure 11).

Not surprisingly, veteran computer users have had more experience using technology with their students on a regular basis than they have had using it as a personal tool. Forty-four percent report having used computers with their students every week for 3-10 years, 27.5% for 1-2 years, and 25.3% for less than 1 year (see Figure 12).

RITTI participants have much less experience using telecommunications tools for professional or recreational purposes. Nearly three-quarters have been using telecommunications for less than 2 years, 19% for 3-5 years, and only 3.9% for 6-10 years. RITTI educators' use of telecommunications tools with their students is even more recent. Forty-two percent have been using this technology with their students for less than a year, 19% for 1-2 years, 7.9% for 3-5 years, and only 1.1% for 6-10 years. Nearly a third (29.9%) of these teachers are not currently using telecommunications technology with their students (see Figures 13 & 14). These findings reflect the fact that the majority of participants' schools do not yet have adequate computer and Internet access available at the classroom level (see **Barriers to Use of Computers and the Internet** and **Technology Infrastructure in Respondents' Schools** sections of this report).

When looking at the number of hours these educators are using their laptops, it is clear that they are investing substantial amounts of personal and professional time. More than two-thirds of RITTI participants are using computers, both on- and off-line, for more than 10 hours each week. Overall, participants average 13.8 hours per week. The majority (58%) of their computer use takes place at home, rather than at school (42%). The amount of time participants spend exclusively online (i.e., searching the World Wide Web, sending email, participating in the RITTI listserv) averages a total of 8 hours per week. Over two-thirds (70.9%) of their online time is conducted at home (see Figures 15a-15d).

RITTI participants report making use of a variety of resources in learning how to use computers and the Internet. Not surprisingly, nearly all of the respondents (96%) note their participation in the RITTI summer training program. Three-quarters of the respondents also describe themselves as self-taught. Sixty percent report learning from teachers and colleagues in their schools and 60% cite in-service courses offered by their districts. Nearly half of the respondents report attending conferences on their own time and over a third note that friends and family members have played an important role in their learning to use technology (see Figure 16).

When queried about whom they have sought support from during the past 6 months on a weekly basis, participants report turning to their colleagues, using the RITTI listserv, learning from their students, and using University of Rhode Island (URI) support personnel. In particular, URI technical support has played an important role for an overwhelming number of participants, with nearly every RITTI participant (99.3%) reporting having used this resource at least once during the pilot implementation (see Figure 17).

16

RITTI participants were asked to rate their ability to use a variety of computer and Internet tools before and after their participation in the summer training. It is evident that the RITTI summer training has had an extremely positive impact on teachers' technology skills. For example, 43.4% of the participants rated their word-processing ability as medium to high prior to the RITTI training; this number increased to 98.9% of all respondents after the training. Similar dramatic increases were reported in participants' ability to use database, spreadsheet, drawing, and presentation applications. Participants' also reported substantial increases in their ability to make use of a variety of Internet tools (see Figure 18).

Figure 11
Years Using Computers Daily

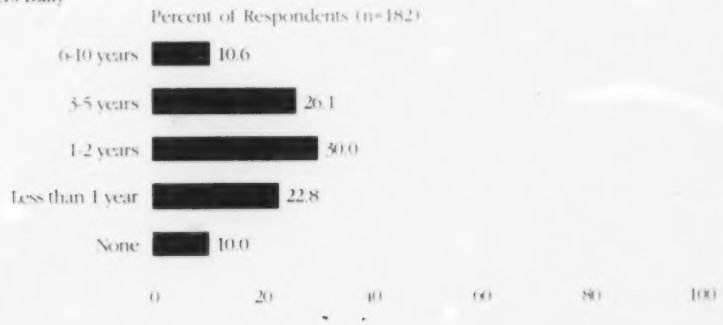


Figure 12
Years Using Computers with Students Every Week

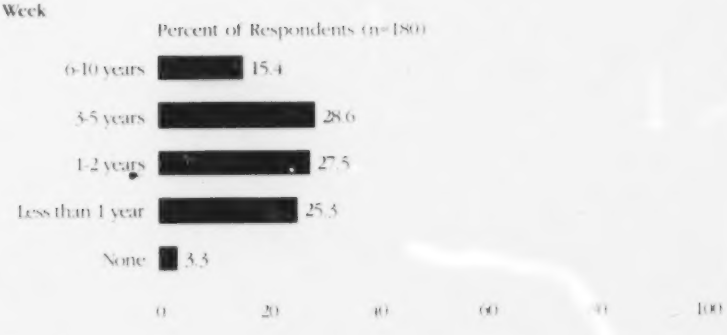
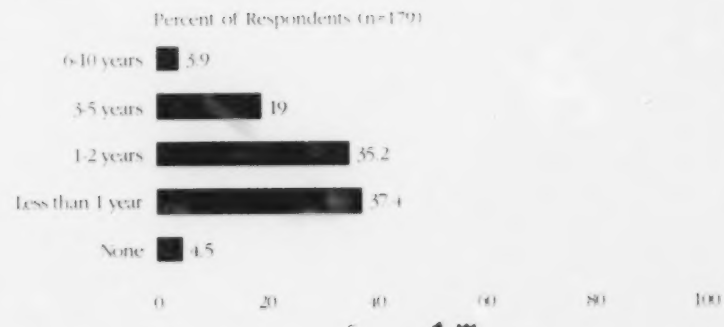


Figure 13
Years Using Telecommunications for Professional or Recreational Purposes



Sources

Figure 11
RITTI question 6a.

Figure 12
RITTI question 6b.

Figure 13
RITTI question 6c.

Figure 14
RITTI question 6d.

Figure 15a
RITTI question 7a.

Figure 15b
RITTI question 7b.

Figure 15c
RITTI question 7a.

Figure 15d
RITTI question 7b.

Figure 16
RITTI question 8.
Multiple responses possible.

Figure 17
RITTI question 63.

Figure 18
RITTI question 9; RITTI question 10.

This training has provided me with much knowledge about computers and applications. I am now able to search for information on the Internet; use email and software; and create Web pages. I have used my experience to develop forms and documents used in school. My goal is to bring computers into my art room so children can experience the importance of today's increasing use of technology.

17

Figure 14
Years Using Telecommunications with Students

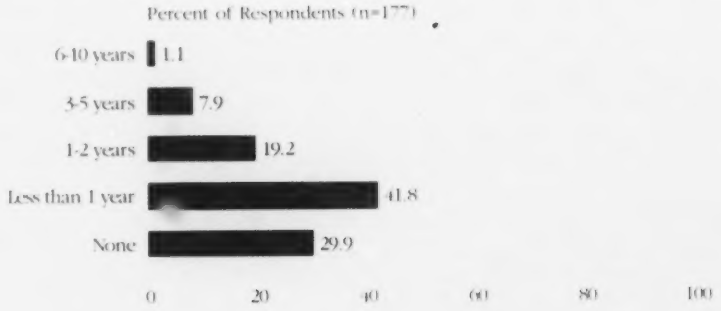


Figure 15a
Total Computer Use per Week

Average Use = 13.8 hrs. per week

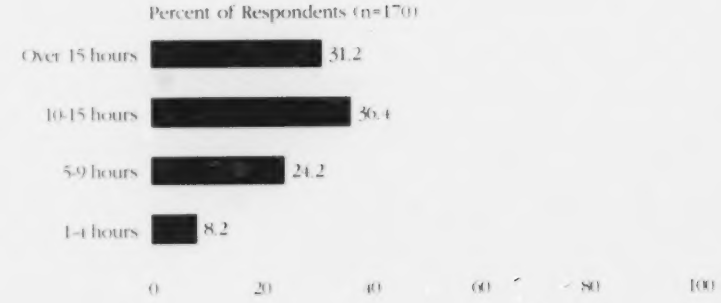


Figure 15b
Total Internet Use per Week

Average Use = 8.0 hrs. per week

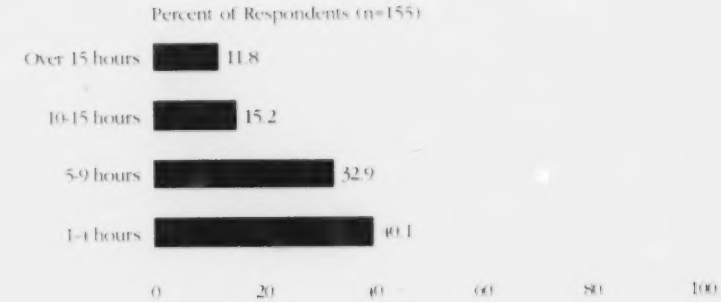
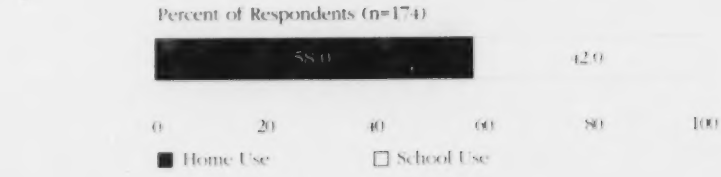


Figure 15c
Total Computer Use by Location



Learning to use the Internet and email were the most helpful. I had no prior experience and now use both comfortably.

18

Figure 15d
Total Internet Use by Location

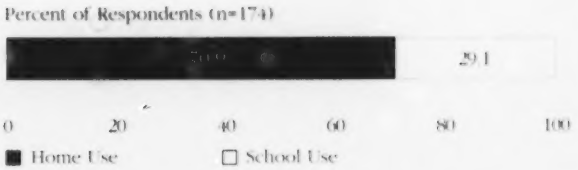
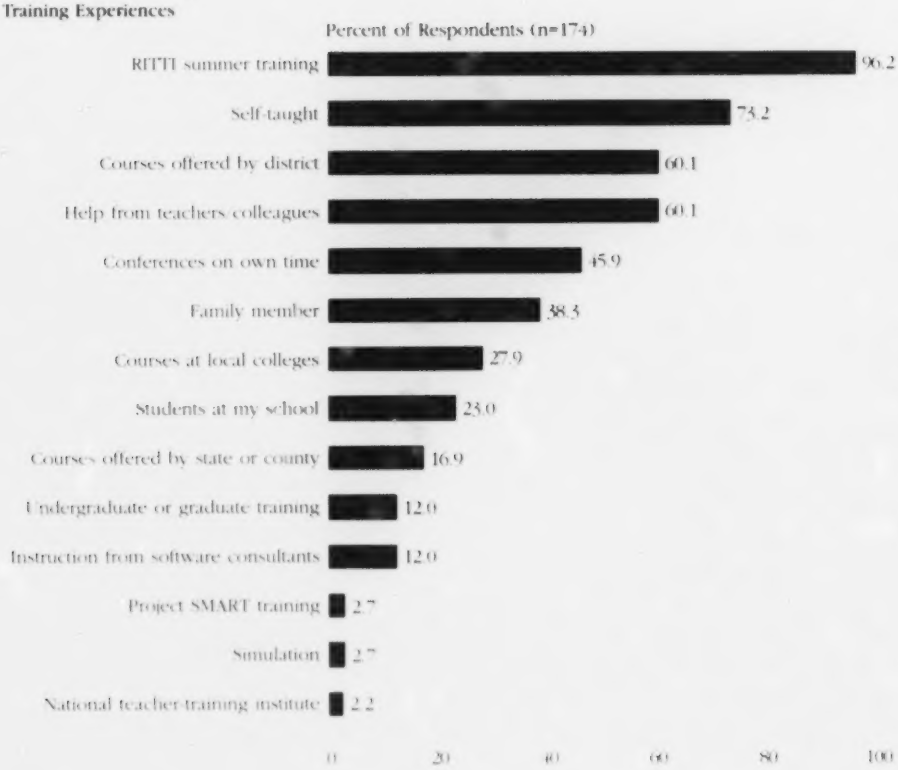
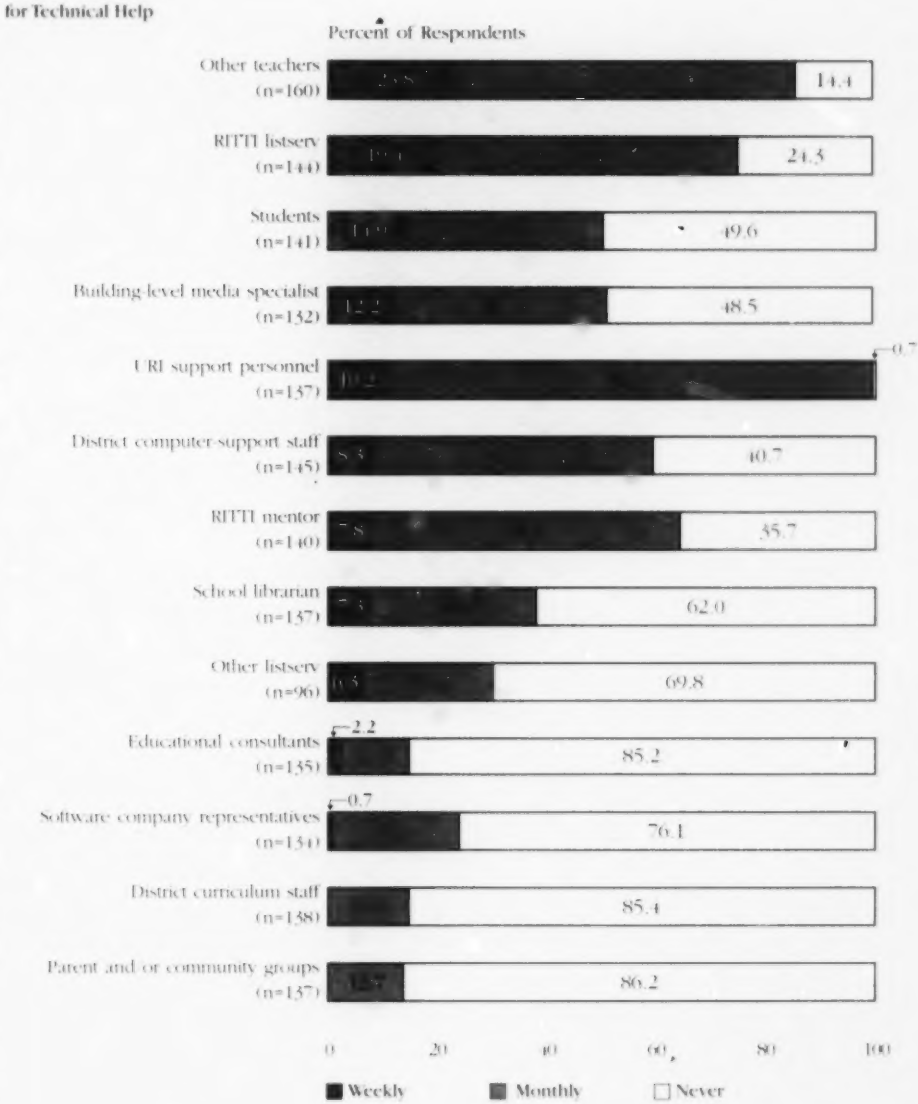


Figure 16
Computer and Internet Training Experiences



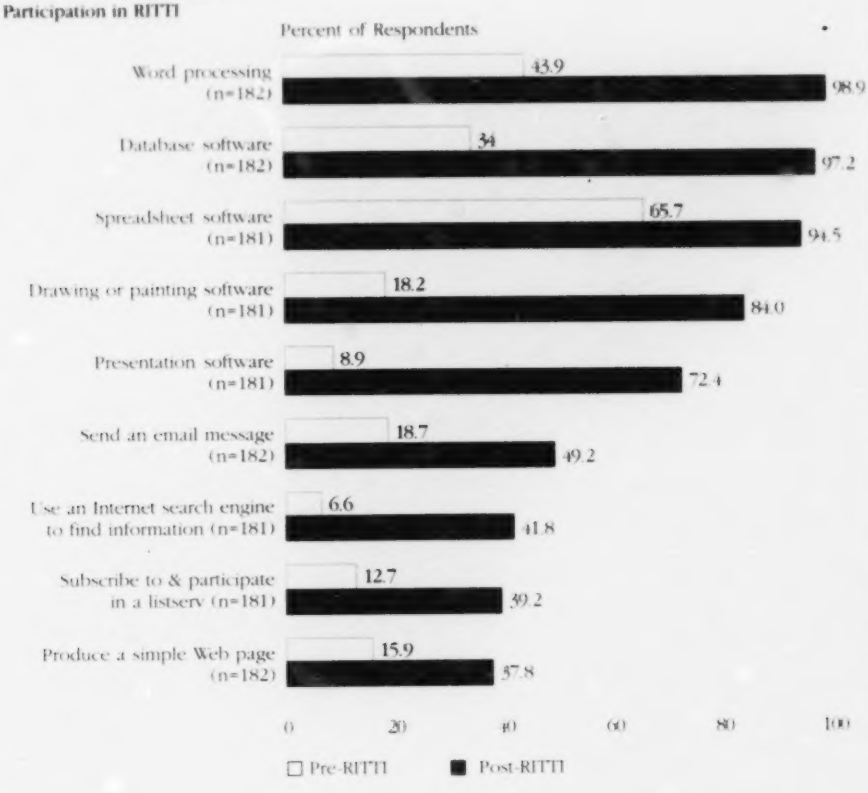
19

Figure 17
Where Teachers Go for Technical Help



20

Figure 18
Technical Proficiency Before and After Participation in RITTI



There was not one part of that training that was not helpful. I benefited from each and every minute of that training. I wish I could sit in on this summer's sessions to reinforce my learning and learn what I missed.

CLASSROOM PRACTICES

- **RITTI educators use the Internet to gather information for instructional purposes, to communicate with colleagues, and to plan and prepare lessons.**
- **RITTI enables teachers to substantially change their professional practices.**
- **RITTI changes how teachers interact with their students.**
- **RITTI educators describe computers as essential to their current teaching practices.**
- **RITTI educators use the Internet to build their own curriculum units.**

It is clear that RITTI teachers are spending a significant amount of time (see Figure 15a, page 18) using technology both at home and at school. The data reported below suggest that this time is being spent primarily on curricular and professional development activities rather than on direct classroom instruction with students. This is no doubt a result of limited access to computers and even more limited access to the Internet in participants' schools.

The most common use of the Internet by RITTI educators (85.9%) is to gather information for instructional purposes. A majority (76.7%) of respondents also spend at least an hour per week developing their Internet skills and increasing their awareness of what is available online. Over half of the participants spend at least an hour per week on the Internet for communication with colleagues and for planning and preparation work. Less than a fifth (17%) of these teachers report using the Internet to communicate with parents (see Figure 19).

When asked to describe their students' use of the Internet, close to half of the respondents (45.4%) say they have directed and supervised their students' use of the Internet, while almost a third (30.9%) report that students do not use the Internet for their classes. Nearly a fifth of the participants (17.8%) report that some of their students use the Internet on their own initiative for their classes, and a few respondents (5.7%) say that someone else directs their students' use of the Internet (see Figure 20a). Figure 20b confirms that a lack of Internet access during teachers' preparation time has a pronounced impact on the way RITTI educators utilize the Internet with their students. Teachers who have Internet access on some or most days are significantly more likely to direct and supervise their students' use of the Internet than are those teachers who have either no or infrequent access to the Internet.

Since their involvement in RITTI, respondents have been working more with other teachers on curriculum and instructional planning and participating in more conferences and workshops. Respondents also report substantial changes in their professional outlook. Two-thirds say they are now more reflective about their teaching practice. RITTI teachers also report changes in how they interact with students. They more often find themselves acting as coach or adviser, and more than half of the respondents allow themselves to be taught by their students. Teachers also report changes in their students, who now take more initiative outside of class time and more frequently offer and seek advice from one another. Despite concerns frequently raised in the popular press, these educators do not perceive an increase in their students' tendency to plagiarize (see Figure 21).

Respondents report that when they have their students participate in learning activities on the computer, individual students use computers for an assignment or school project (77.2%). Two-thirds of these educators have their students work in small teams or groups within a class for an assigned project. RITTI participants also perceive that, motivated by a personal interest in the technology, their students are using computers for their own independent work and not because it is required for class assignments (56.7%) (see Figure 22).

RITTI teachers have their students participate in a range of technology-related activities during the year, though rarely on a daily or weekly basis. On at least a monthly basis, nearly half of the respondents have their students look at sites and search for specific information on the World Wide Web, and half assign work which requires students to use computers (see Figure 23).

Over three-fourths of these educators rated computers as either extremely essential (49%) or moderately essential (37%) to their current teaching practices (see Figure 24).

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22

Multiple factors motivate RITTI teachers' use of technology as an instructional resource, from preparing students for life in an increasingly technological society to ensuring that all students have opportunities to access technology resources. Other important reasons that motivate these educators' use of computers and the Internet include increasing student motivation, providing resources not available in textbooks, and helping students feel more a part of the global community. Very few teachers cited district curricular requirements as an important motivating factor in their decision to use computers and the Internet at school (see Figure 25).

When asked to rank six factors that make the Internet a valuable educational resource, providing access to curriculum-relevant information and providing opportunities for gathering resources that enable teachers to build their own curriculum units received the highest rankings (see Table 1).

Figure 19
Uses of Internet for which Respondents Spend at Least an Hour Each Week

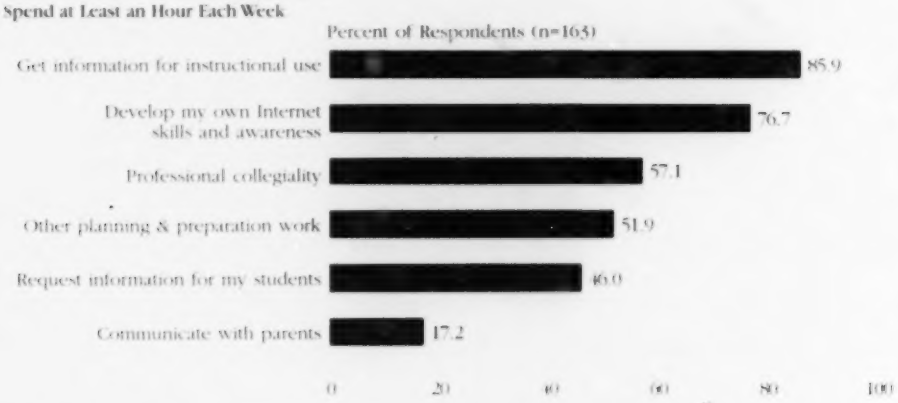


Figure 20a
How Internet Is Used with Students

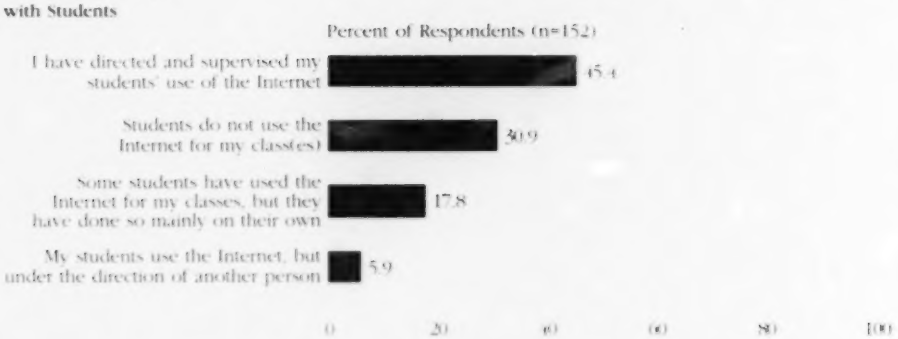
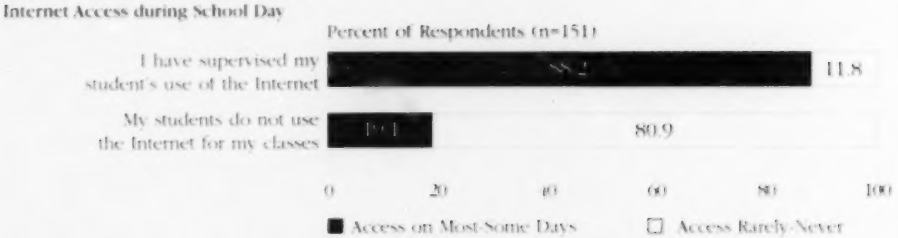

Percent of Respondents (n=152)
I have directed and supervised my students' use of the Internet
45.4
Students do not use the Internet for my class(es)
30.9
Some students have used the Internet for my classes, but they have done so mainly on their own
17.8
My students use the Internet, but under the direction of another person
5.9
0
20
40
60
80
100

Figure 20b
Teachers' Involvement in Students' Internet Use Compared with Teachers' Internet Access during School Day



Sources

Figure 19
RITTI question 14.

Figure 20a
RITTI question 15.

Figure 20b
RITTI question 12; RITTI question 15.

Figure 21
RITTI question 16.

Figure 22
RITTI question 17.

Figure 23
RITTI question 18.

Figure 24
RITTI question 21.

Figure 25
RITTI question 22.

Table 1
RITTI question 23.

23

Figure 21
Changes Observed in Classroom Practices

Percent of Respondents
I have been involved in conferences, workshops, and activities that bring me into contact with more teachers (n=160)
0.7
I have become reflective about basic teaching goals and priorities of different outcomes (n=154)
I find myself in the role of coach or adviser in the classroom (n=155)
0.6
I allow myself to be taught by my students (n=149)
I find that my students offer advice and seek advice from one another (n=152)
1.5
I find that my students are taking initiative outside of class time (n=148)
0.7
I teach units and lessons that are interdisciplinary building in topics from other courses or subjects (n=150)
I spend time working with other teachers on curriculum and instructional planning (n=155)
2.6
I discuss with my students a subject which is fairly new to me (n=150)
1.3
I have the need for longer blocks of time longer periods (n=155)
2.0
I have gained skill in orchestrating multiple parallel activities in the classroom (n=152)
1.3
I have students conduct their own research (n=147)
I have students work on long projects (n=155)
0.7
I have gained more skill in organizing cooperative work groups (n=152)
0.7
I have students address problems linked to real-world contexts (n=150)
0.7
I have students review and revise their own work (n=154)
0.6
I have students explore a topic on their own, without procedural direction (n=152)
2.0
I have students get out of their seats and work actively in the classroom (n=152)
0.7
I let students decide what materials or resources to use (n=149)
2.0
I have to deal with controversial social issues in the classroom even though they are not a part of the curriculum (n=148)
5.4
I have students select their own topic based on their own interest (n=150)
1.3
I have students do work that is put to use by someone or some group (n=144)
2.1
I have technical difficulties which continually require me to change my lesson plans at the last minute (n=144)
29.2
I have students plagiarizing work (n=158)
10.9
0
20
40
60
80
100
More Now
The Same
Less Now

24

Figure 22
Frequency of Internet Use by Instructional Strategy

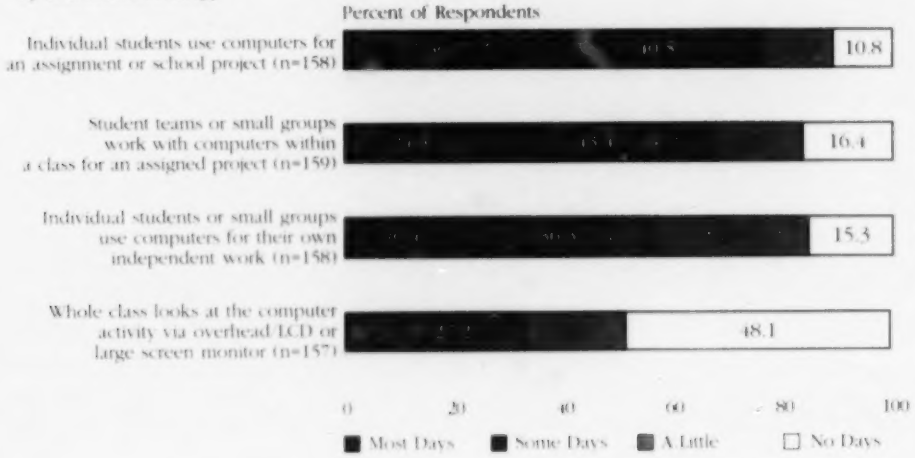

Percent of Respondents
Individual students use computers for an assignment or school project (n=158)
10.8
Student teams or small groups work with computers within a class for an assigned project (n=159)
16.4
Individual students or small groups use computers for their own independent work (n=158)
15.3
Whole class looks at the computer activity via overhead LCD or large screen monitor (n=157)
48.1
0
20
40
60
80
100
Most Days
Some Days
A Little
No Days

Figure 23
Students' Participation in Computer Learning Activities

Percent of Respondents
Search for specific information online (n=157)
53.8
Look at sites on the World Wide Web (n=159)
27.7
Use content-specific programs to reinforce or further explore content related to my curriculum (n=154)
48.1
Participate in ongoing email exchanges with individual students (n=157)
60.5
Participate in ongoing email exchanges with whole classes (n=157)
65.6
Contribute to creation of Web pages with many class members (n=158)
79.1
Use presentation tools to represent projects they are doing in class (n=157)
47.1
Use database and spreadsheet programs to gather and present information (n=156)
73.1
Follow scientists doing work around the world as they are doing it (n=154)
4.5
70.1
Participate in collaborative math or science investigations (n=155)
4.5
70.3
Participate in collaborative writing projects with classes in other schools (n=156)
4.5
81.4
Participate in telementoring email exchanges between students and adult mentors (n=155)
4.5
89.0
Participate in projects in which students interview community members and report community opinion or experiences on Web pages (n=156)
1.9
91.0
0
20
40
60
80
100
Weekly
Monthly
Never

Figure 24
How Essential Computers Are to Teaching

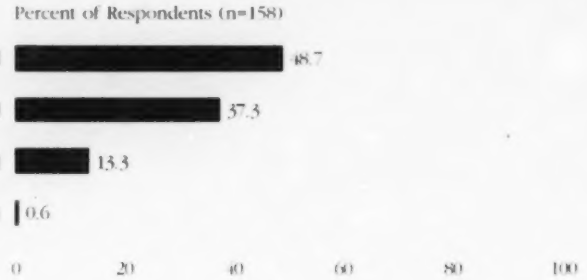
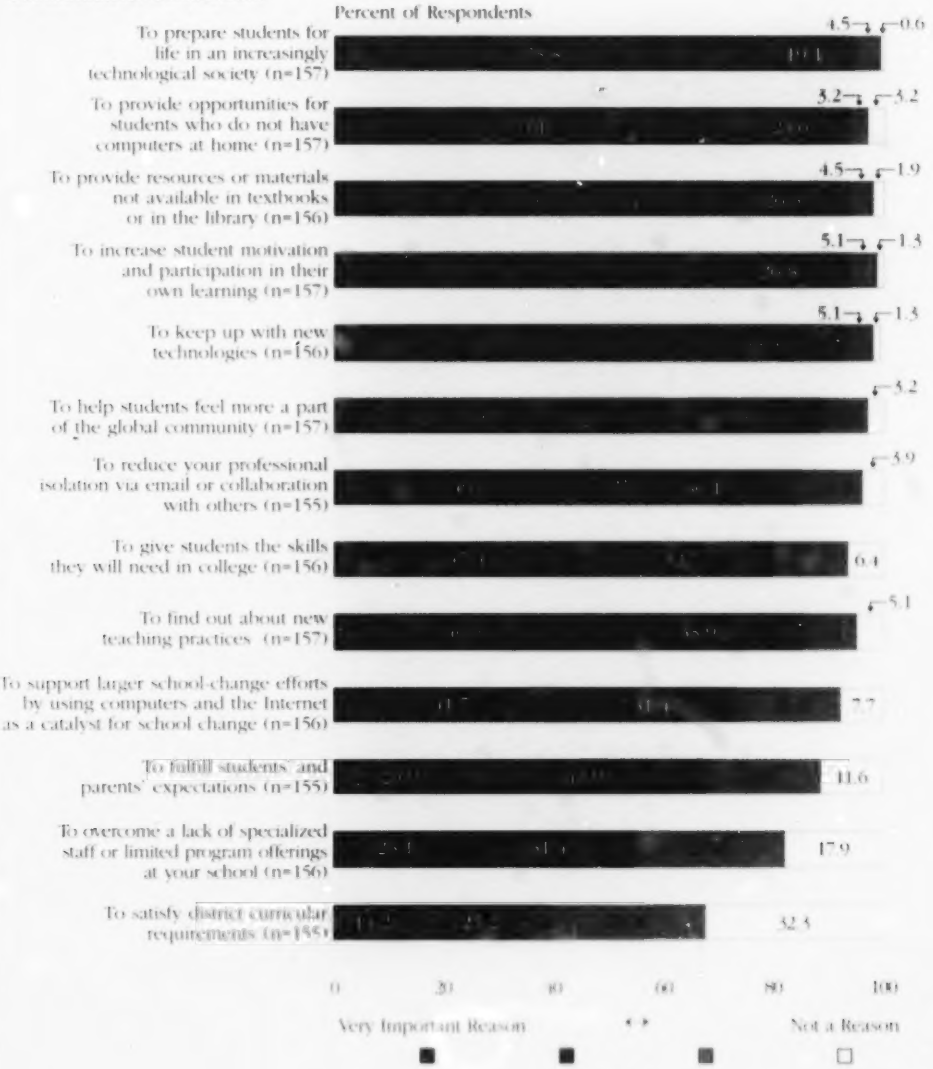


Figure 25
Why Teachers Use Computers and the Internet with Students


Percent of Respondents
To prepare students for life in an increasingly technological society (n=157)
4.5
0.6
To provide opportunities for students who do not have computers at home (n=157)
3.2
3.2
To provide resources or materials not available in textbooks or in the library (n=156)
4.5
1.9
To increase student motivation and participation in their own learning (n=157)
5.1
1.3
To keep up with new technologies (n=156)
5.1
1.3
To help students feel more a part of the global community (n=157)
3.2
To reduce your professional isolation via email or collaboration with others (n=155)
3.9
To give students the skills they will need in college (n=156)
6.4
To find out about new teaching practices (n=157)
5.1
To support larger school-change efforts by using computers and the Internet as a catalyst for school change (n=156)
7.7
To fulfill students' and parents' expectations (n=155)
11.6
To overcome a lack of specialized staff or limited program offerings at your school (n=156)
17.9
To satisfy district curricular requirements (n=155)
32.3
0
20
40
60
80
100
Very Important Reason
Not a Reason

26

Table 1
Ranking of Six Reasons to Use the Internet as an Educational Resource

Mean Rank	Reasons to use Internet
4.8	Provides access to a large variety of curriculum-relevant information for teachers and students
4.1	Provides an opportunity for teachers to gather resources and construct their own curriculum units
5.2	Enables students to participate in research and problem-solving with scientists and other specialists
5.2	Enables students to communicate with other students across the world
5.1	Enables teachers to actively collaborate with other teachers across the country who share similar interests
2.7	Provides a broader audience for each student's work, therefore making writing and other academic tasks more meaningful

I was a total newcomer to technology, so all the technical computer training was very necessary. My project got me to begin thinking of ways to integrate technology into all aspects of my 4th-grade curriculum.

27

IMPACT ON STUDENT LEARNING

- **Students are integrating multiple resources into projects, working more collaboratively with peers, and taking more initiative for their own learning.**
- **Technology is having an impact on students' problem-solving, data analysis, and data interpretation skills.**
- **RITTI educators feel that technology is not exacerbating issues of equity in learning for all students.**
- **Introducing technology into classroom contexts requires teachers to develop new strategies for helping students interpret and analyze information.**

Since participating in RITTI teachers have observed a number of positive changes in their students' abilities and work habits. More than half note that their students are working more collaboratively with peers, are using a variety of resources in their work, and are more self-directed in their learning. More than half the teachers also observe that their students feel more successful and positive about themselves and that RITTI is helping all students, not just the traditionally high achievers, acquire expertise and produce quality products. In contrast to these observed benefits, teachers do not feel that RITTI is having a direct impact on students' performance on state- or city-mandated tests. This finding is consistent with prior research suggesting a gap between what teachers *know* the creative use of technology can do for their students, and what traditional measures of assessment *actually* account for (Honey & Henriquez, 1993) (see Figure 26).

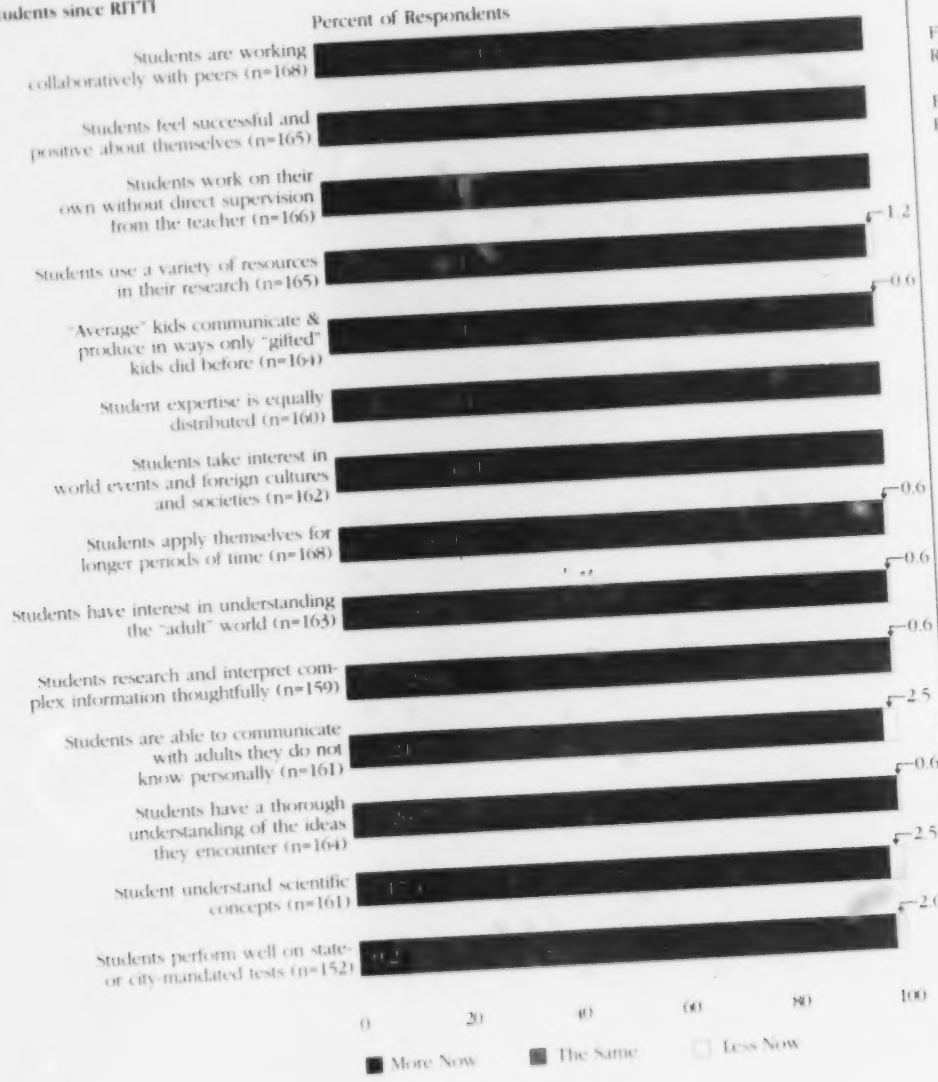
It is evident from participants' responses that computers are substantially changing the way in which their students learn. Access to technology is having a positive impact on students' problem-solving, data analysis, and data interpretation skills. Teachers report that their students are more likely to be involved in problem-based learning activities, and are more apt to be learning through the process of interpreting and analyzing information resources. Teachers also believe that computers are helping their students acquire a host of pragmatic skills that range from technical know-how to effective communication strategies. How learning is taking place is changing as well. The use of technology is making it possible for students to engage in more interdisciplinary work, to collaborate with peers, and to be more involved in community-based issues (see Figure 27).

While the potential of technology to impact positively on student learning is great, we also know that using technology as a learning tool can exacerbate problems such as quantity versus quality; understanding of information resources; and equity and access issues. Slightly over one-third of the teachers (39%) report that their students are now more likely to want to focus only on projects that involve the Internet and computers. While this does not imply that there is anything inherently problematic about the use of technology, it does suggest that for those students with a taste of the power and potential of conducting computer-based projects, adequate and regular access to technology is going to become increasingly necessary to sustain their interests. Approximately a third of the teachers do note, however, that when students use the Internet to find information on a topic, they tend to confuse "finding" with "understanding." This observation, along with a feeling on the part of some teachers (30.3%) that students can use technology to obscure their lack of understanding, suggests that educators are going to have to develop new techniques and strategies for helping students make use of the technology in ways that can support substantial and meaningful learning.

It is also important to note that RITTI educators do not believe the technology is widening the gap between "gifted" and "average" students, nor do they feel that there are substantial barriers to non-English-speaking students' use of the Internet. Finally, RITTI educators feel that rather than hindering the student-teacher relationship, technology is enhancing it (see Figure 28).

28

Figure 26
Benefits Observed in Students since RITTI


Percent of Respondents
Students are working collaboratively with peers (n=168)
Students feel successful and positive about themselves (n=165)
Students work on their own without direct supervision from the teacher (n=166)
Students use a variety of resources in their research (n=165)
"Average" kids communicate & produce in ways only "gifted" kids did before (n=164)
Student expertise is equally distributed (n=160)
Students take interest in world events and foreign cultures and societies (n=162)
Students apply themselves for longer periods of time (n=168)
Students have interest in understanding the "adult" world (n=163)
Students research and interpret complex information thoughtfully (n=159)
Students are able to communicate with adults they do not know personally (n=161)
Students have a thorough understanding of the ideas they encounter (n=164)
Student understand scientific concepts (n=161)
Students perform well on state- or city-mandated tests (n=152)
1.2
0.6
0.6
0.6
2.5
0.6
2.5
2.0
0
20
40
60
80
100
More Now
The Same
Less Now

Sources

Figure 26
RITTI question 24.

Figure 27
RITTI question 28.

Figure 28
RITTI question 25.

Students are coming in with questions they never had before.

The emphasis needs to be on the synthesis and evaluation of resources. You no longer have to spend time getting information; now you can concentrate on pulling it all together.

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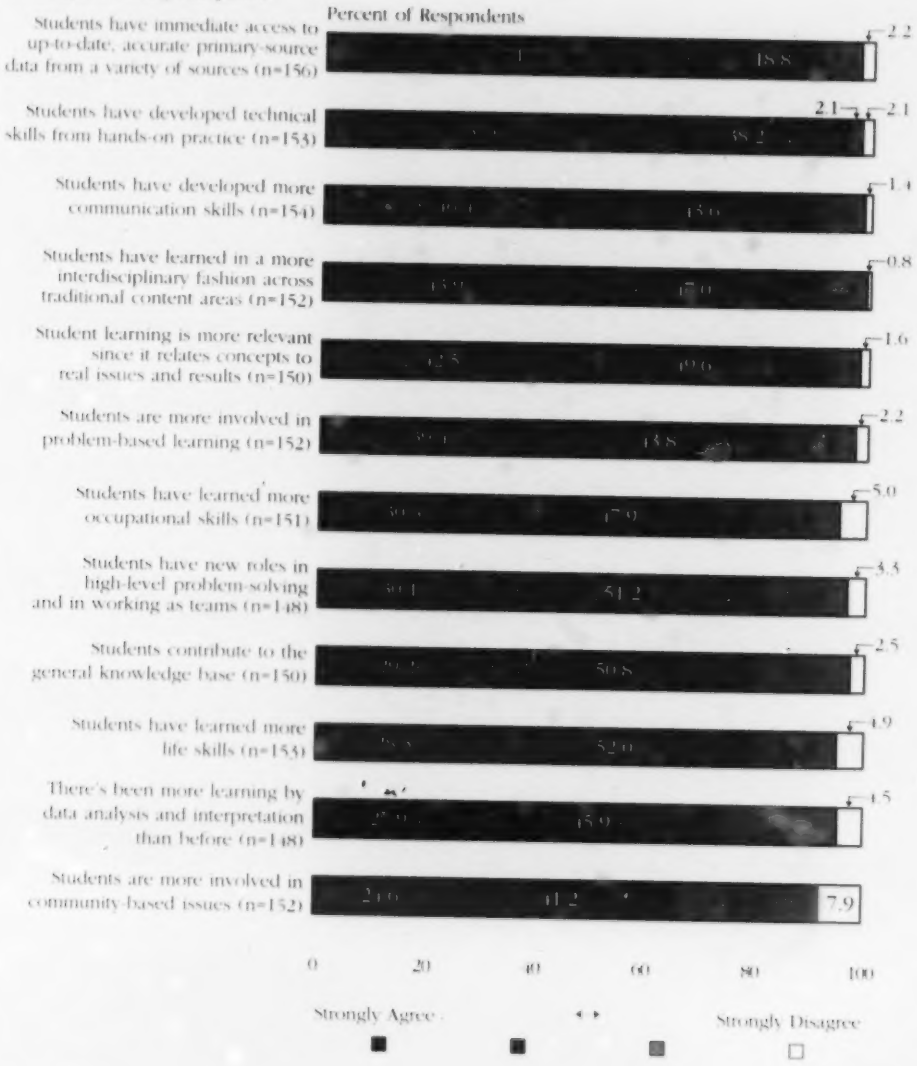
29

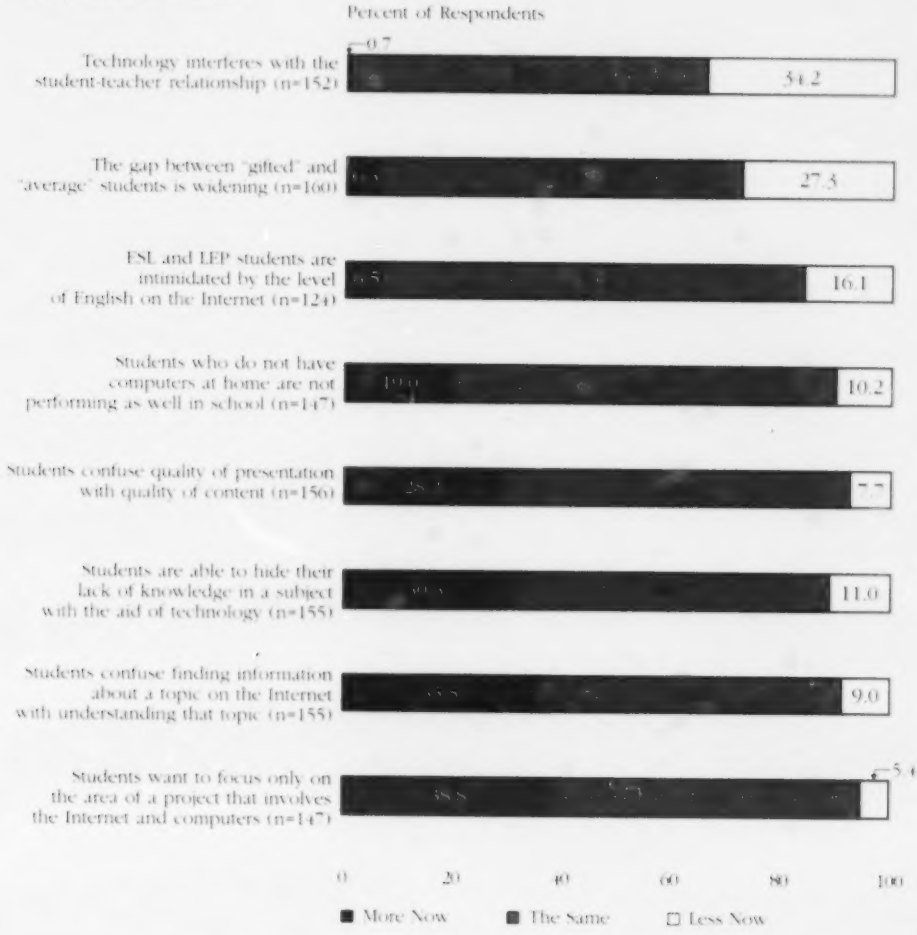
Figure 27
Contribution to Student Learning from Using Computers



I can't believe what I can do now for my students and my colleagues that I never thought was possible. The students are much more creative in their work—they're definitely more engaged.

30

Figure 28
Disadvantages of Using Computers with Students


Percent of Respondents
Technology interferes with the student-teacher relationship (n=152)
0.7
34.2
The gap between "gifted" and "average" students is widening (n=160)
27.3
ESL and LEP students are intimidated by the level of English on the Internet (n=124)
16.1
Students who do not have computers at home are not performing as well in school (n=147)
10.2
Students confuse quality of presentation with quality of content (n=156)
Students are able to hide their lack of knowledge in a subject with the aid of technology (n=155)
11.0
Students confuse finding information about a topic on the Internet with understanding that topic (n=155)
9.0
Students want to focus only on the area of a project that involves the Internet and computers (n=147)
5.4
0
20
40
60
80
100
More Now
The Same
Less Now

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Computer technology know-how is the future. Our students need this knowledge for their success!!

THE RHODE ISLAND TEACHERS AND TECHNOLOGY INITIATIVE

- RITTI educators are becoming proactive leaders in their districts' technology initiatives.
- Participants have developed enormous confidence in their own technical capabilities.
- They are
  - supporting their colleagues
  - helping to develop strategies for integrating technology into their schools' curricula
  - making decisions about what hardware and software programs their schools should purchase.
- RITTI is reinvigorating teachers' commitment to their work.
- Participants rate the RITTI training experience as significantly better than other professional development experiences.

These educators chose to participate in RITTI for several important reasons. First and foremost, this group was interested in receiving intensive training in using computers and the Internet (96.1%). Receiving a laptop computer was also an important factor (80.6%), but not as critical as the training. Nearly two-thirds of participants chose to participate in RITTI in order to acquire the skills that would enable them to become technology leaders in their schools, and more than half were motivated by the opportunity to join a supportive community of educators (see Figure 29).

Respondents report that RITTI has had a significant impact on the degree to which their input is sought by decisionmakers in their school or district regarding computer-related issues. Since participating in RITTI, more than half of these educators now feel that they have frequent opportunities to voice their concerns to decisionmakers, that their opinions are sought before decisions are made, and that they are now kept up to date about their schools' or districts' technology initiatives. Thirty-seven percent of respondents also note that they are more likely to turn to a trusted colleague to voice concerns (see Figure 30).

These educators also report increases in their involvement in their schools' or districts' technology-related activities since participating in RITTI. Among the changes noted, the most striking are increases in providing services to other teachers, such as training or technical support; developing ways of integrating computers into the curriculum; and reviewing, selecting, or purchasing hardware and/or software products. Over half of the respondents cited positive change in their involvement in developing school or district-wide guidelines and policies for computer and Internet use, and over half note that they are now serving on computer-related planning committees at the school or district level (see Figure 31).

RITTI has also had a significant impact on teachers' perceptions of their own technical competence and their ability to help further their schools' technical agenda. Almost all respondents either strongly (49%) or moderately (40%) agree that they have more confidence in their capabilities in utilizing technology. Most feel they no longer have to rely upon the one designated computer expert in their school and that they are now seen as a knowledgeable person with respect to computer technology. Since participating in RITTI, these educators are also more likely to attend technology conferences and meetings and participate in discussions concerning the use of technology in their school (See Figure 32).

Another important impact of this initiative is the extent to which it has reinvigorated teachers' commitment to their professional work. Nearly all (90%) of these educators agree that RITTI has reenergized their commitment to their current jobs (see Figure 33).

RITTI provides participants with a variety of supports for integrating technology into their work in schools, all of which are considered useful by the majority of respondents. These educators value the technical skills they have learned as well as the collegial relationships they have formed during the summer training. Almost every respondent rates learning technical skills during the summer training as either extremely useful (83%) or moderately useful (13%). Respondents also say that opportunities to interact with colleagues at conferences and via the RITTI listserv, as well as technical support provided by trainers, mentors, and URI personnel, are all useful aspects of the program (see Figure 34).

A key component of the RITTI training is to enable teachers to integrate technology into an already existing unit of practice. This aspect of the training is highly valued by the vast majority of respondents, who report that it gave them a better understanding of the process of integrating technology into the curriculum, as well as something

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they could implement immediately with their students and share with colleagues (see Figure 35).

Taken as a whole, these educators are extremely positive about the overall RITTI training experience, describing it as either much better (70%) or better (23%) than other professional development experiences in which they have participated (see Figure 36).

Figure 29
Reasons for Participating in RITTI

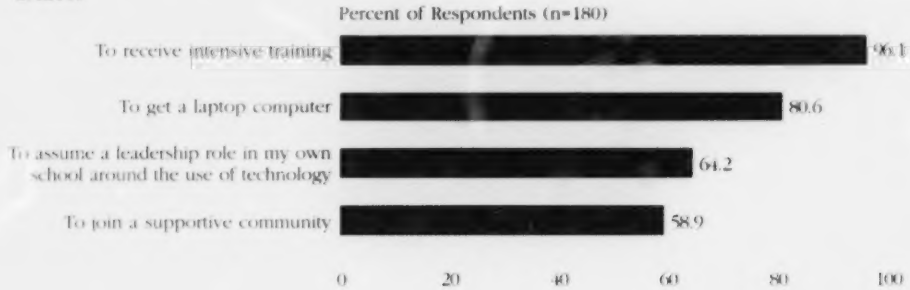
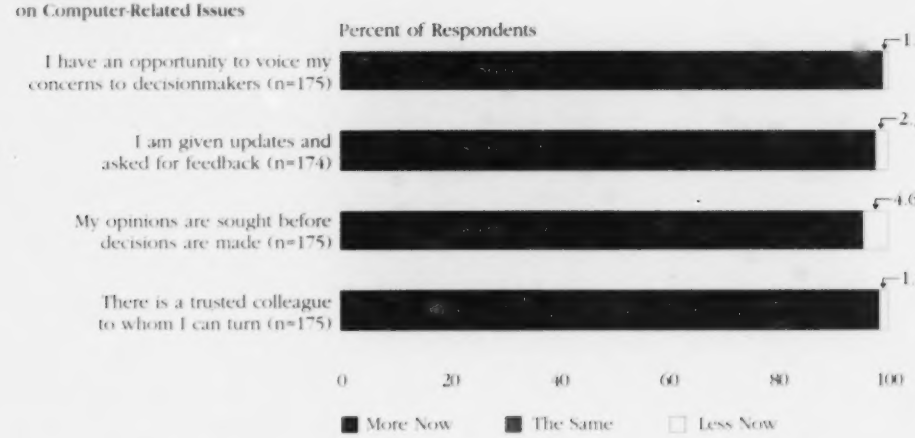


Figure 30
How Often Teachers' Input Is Sought by Decisionmakers on Computer-Related Issues



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Sources

Figure 29
RITTI question 31.

Figure 30
RITTI question 32; RITTI question 33.

Figure 31
RITTI question 34; RITTI question 35.

Figure 32
RITTI question 38.

Figure 33
RITTI question 39a.

Figure 34
RITTI question 36.

Figure 35
RITTI question 37.

Figure 36
RITTI question 40.

I am a resource for my colleagues. There isn't just one person in the school anymore to whom people turn for help. People come to me and I go to them.

33

Figure 31
Involvement in School and District Computer Activities

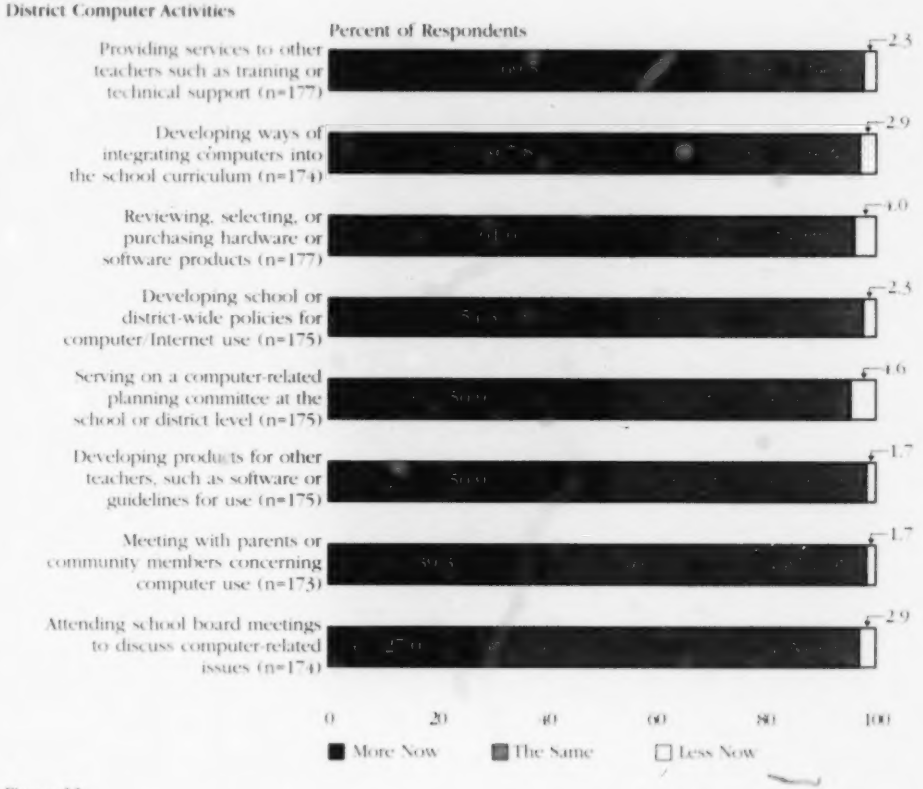
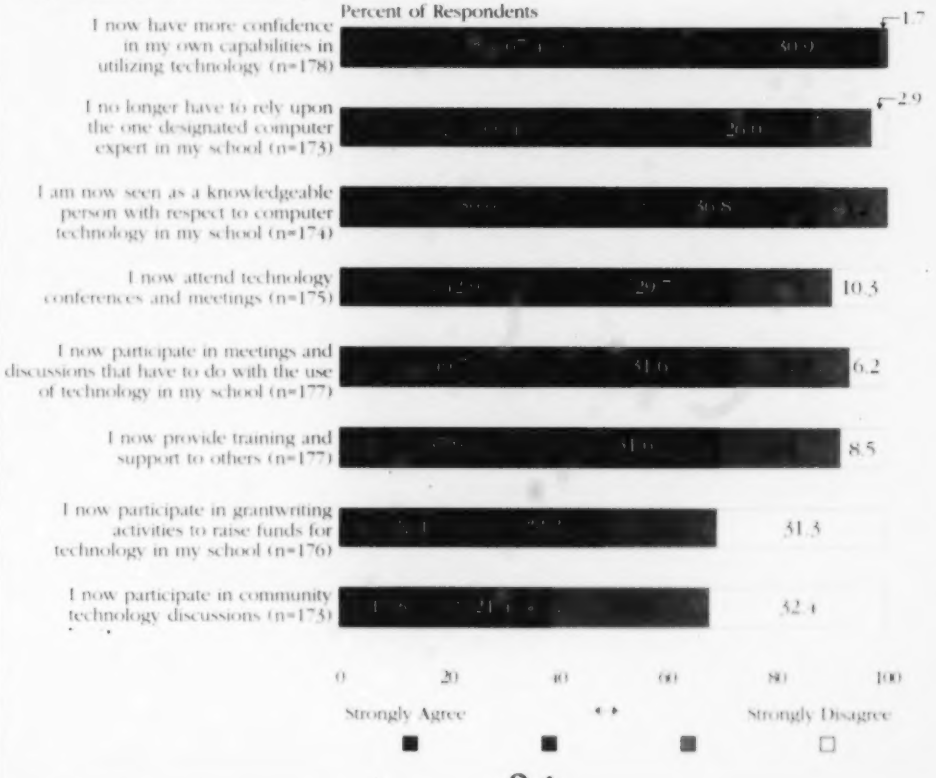

Percent of Respondents
Providing services to other teachers such as training or technical support (n=177)
2.3
Developing ways of integrating computers into the school curriculum (n=174)
2.9
Reviewing, selecting, or purchasing hardware or software products (n=177)
4.0
Developing school or district-wide policies for computer/Internet use (n=175)
2.3
Serving on a computer-related planning committee at the school or district level (n=175)
4.6
Developing products for other teachers, such as software or guidelines for use (n=175)
1.7
Meeting with parents or community members concerning computer use (n=173)
1.7
Attending school board meetings to discuss computer-related issues (n=174)
2.9
0
20
40
60
80
100
More Now
The Same
Less Now

Figure 32
Teachers' Perception of Impact of RITTI on Their Role in School Community


Percent of Respondents
I now have more confidence in my own capabilities in utilizing technology (n=178)
1.7
I no longer have to rely upon the one designated computer expert in my school (n=173)
2.9
I am now seen as a knowledgeable person with respect to computer technology in my school (n=174)
I now attend technology conferences and meetings (n=175)
10.3
I now participate in meetings and discussions that have to do with the use of technology in my school (n=177)
6.2
I now provide training and support to others (n=177)
8.5
I now participate in grantwriting activities to raise funds for technology in my school (n=176)
51.3
I now participate in community technology discussions (n=175)
52.4
0
20
40
60
80
100
Strongly Agree
Strongly Disagree

34

Figure 33
Teachers' Perceptions that RITTI has Reenergized Commitment to Current Job

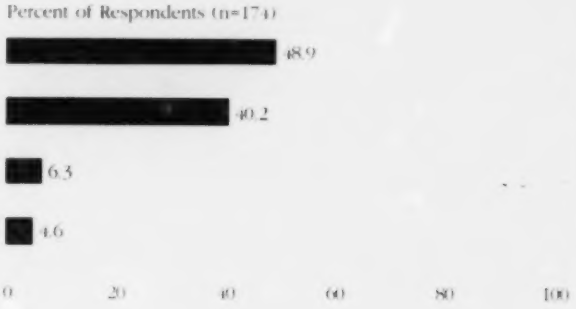
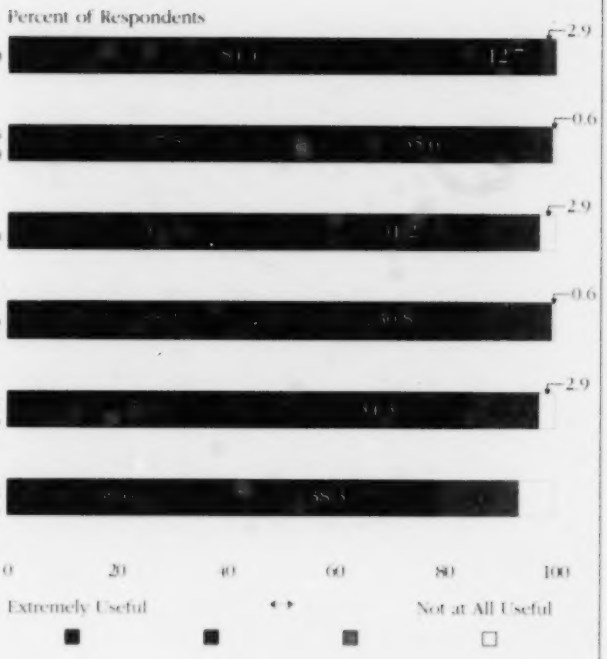


Figure 34
Teachers' Perceptions of Usefulness of RITTI Training



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I've attended at least a half dozen workshops on using the computer in class since the RITTI training. I just can't get enough of this stuff!

Figure 35
Value of Learning to Integrate Technology into an Existing Unit of Practice

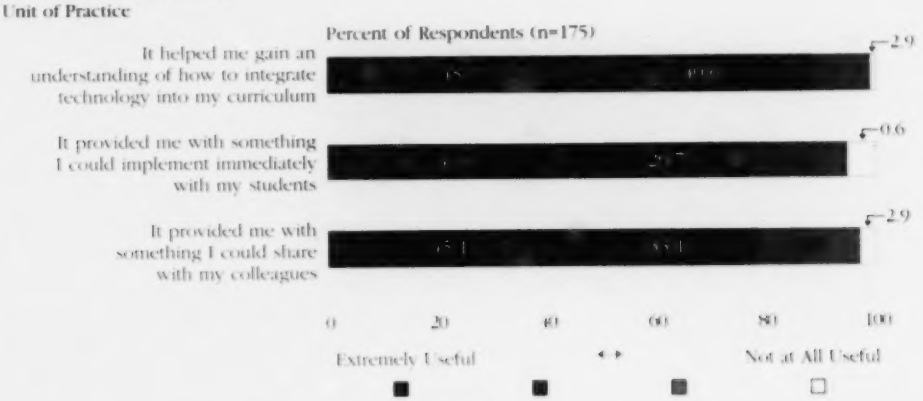
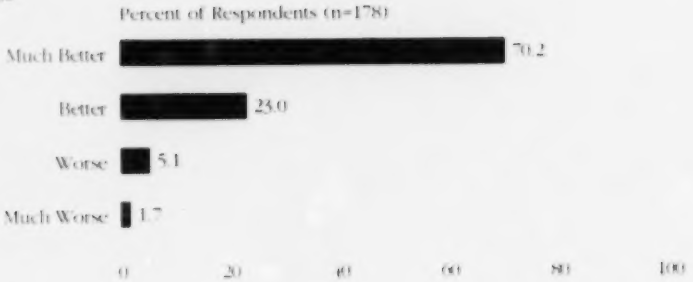


Figure 36
Value of RITTI Training versus Other Professional Development Experiences



The trainers were excellent. The collegial relationships formed remain outstanding.

The trainers were excellent listeners and had great patience. The meetings throughout the year were more valuable for "recharging our batteries" and discussion groups about problem-solving.

BARRIERS TO USE OF COMPUTERS AND THE INTERNET

The barriers to effective use of computers and the Internet cited by RITTI educators are common to many other teachers who have worked to integrate technology into their schools (Ravitz 1998, Honey & Henriquez 1993). Access both to computers and the Internet is the most pronounced barrier noted by RITTI participants. These educators also cite a lack of school-based technical support, training, and advice for computer and Internet projects as impediments to utilizing technology effectively. The majority of respondents also agree that the school schedule does not allow enough time to carry out computer- and Internet-related projects. Approximately half of the RITTI educators agree that meeting the requirements of city- or state-mandated tests also makes it difficult to integrate technology effectively into the curriculum.

The quality of Internet resources is not considered a major barrier by these educators. They do not feel there is a lack of age-appropriate Websites, nor do they feel that the World Wide Web lacks educationally relevant material.

Finally, for this group of educators, lack of support from other teachers for computer and Internet projects is not viewed as a major obstacle (see Figure 37).

- The highest-rated barriers to the effective use of computers and the Internet include:
  - inadequate access to computer hardware and the Internet in schools
  - lack of school-based technical support
  - lack of school-level support for integrating computers into the classroom context
  - lack of time in the school schedule to conduct Internet projects.

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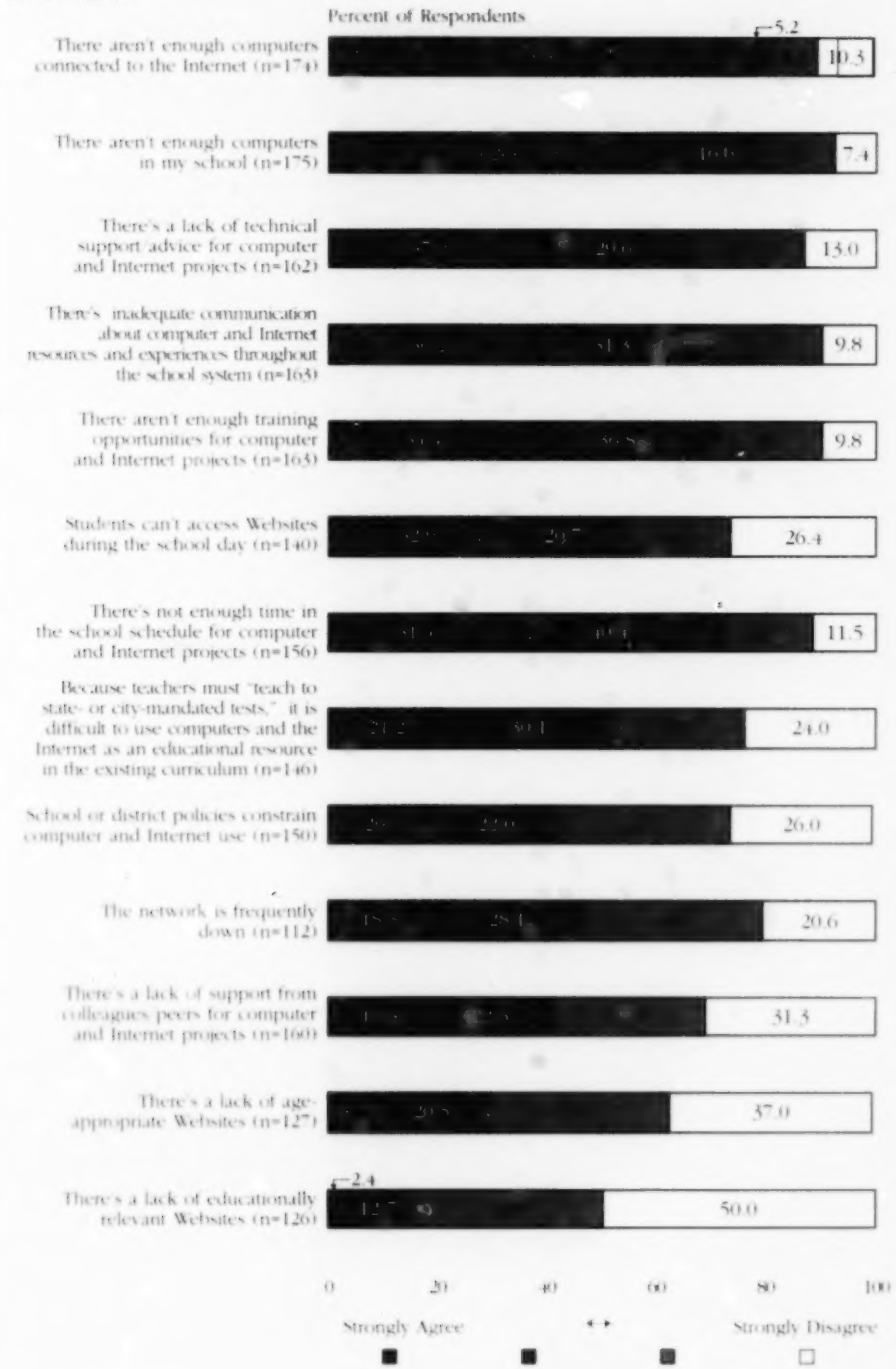
Sources

Figure 37
RITTI question 45

Figure 37
Barriers to Use of Computers and the Internet


Percent of Respondents
There aren't enough computers connected to the Internet (n=174)
5.2
10.3
There aren't enough computers in my school (n=175)
7.4
There's a lack of technical support advice for computer and Internet projects (n=162)
13.0
There's inadequate communication about computer and Internet resources and experiences throughout the school system (n=163)
9.8
There aren't enough training opportunities for computer and Internet projects (n=163)
9.8
Students can't access Websites during the school day (n=140)
26.4
There's not enough time in the school schedule for computer and Internet projects (n=156)
11.5
Because teachers must "teach to state- or city-mandated tests," it is difficult to use computers and the Internet as an educational resource in the existing curriculum (n=146)
24.0
School or district policies constrain computer and Internet use (n=150)
26.0
The network is frequently down (n=112)
20.6
There's a lack of support from colleagues peers for computer and Internet projects (n=160)
31.3
There's a lack of age-appropriate Websites (n=127)
37.0
There's a lack of educationally relevant Websites (n=126)
2.4
50.0
0
20
40
60
80
100
Strongly Agree
Strongly Disagree

We have only one computer hooked up to the Internet, but the kids put all their emails on my laptop, and then I send them and get the responses at home. Sometimes it's frustrating, but we're definitely moving in the right direction.

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TECHNOLOGY INFRASTRUCTURE IN RESPONDENTS' SCHOOLS

- RITTI schools are slightly ahead of schools nationwide when it comes to Internet access.
- Funding for RITTI schools' technology initiatives has come from multiple sources, including foundation, corporate, government, and grassroots efforts.
- RITTI participants have made substantial contributions to their schools' technology visions.

Regarding school Internet connectivity, Rhode Island schools are slightly ahead of the national average. More than three-quarters (78.7%) of RITTI participants' schools have access to the Internet, as compared with 65% nationally (see Figure 39).

When examining the kinds of Internet connections available, RITTI schools look very similar to national averages in terms of higher-end connections (56Kb, T1, ISDN). Though it appears from Figure 40 that RITTI schools have many fewer modem connections than schools nationwide, this is likely due to the fact that the national study allowed respondents to report more than one type of connection, whereas the RITTI survey asked that participants select their primary mode.

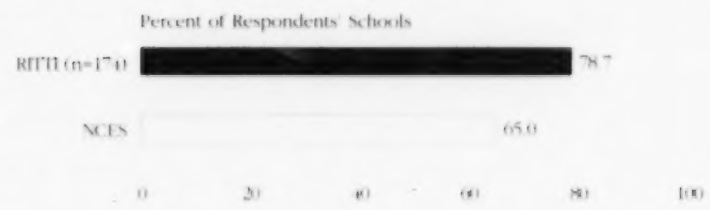
Again, when examining the type of Internet capabilities available, RITTI schools look very similar to public schools nationwide. Among schools that are connected to the Internet, World Wide Web and email access are most broadly available (see Figure 41).

As mentioned in the **Classroom Practices** section of this report, access to computers and the Internet during RITTI teachers' school-day class preparation time appears to have a large impact on the way these educators use technology with their students. On most days almost two-thirds of RITTI educators have access to computers when preparing for classes during the school day. Significantly fewer respondents (41.8%) have Internet access during class preparation time. While only 8.8% report having no access to computers for class preparation time, almost two-thirds report having no Internet access during this time (see Figures 42 & 43).

Foundation, corporate, and government grants, as well as phone company initiatives, have led the way in funding Internet connectivity at respondents' schools. Other sources include teacher-, parent-, and/or PTA-led initiatives, public tariffs such as tax increases or bond initiatives, or community-led initiatives including Net Day and the Rhode Island Tech Corp (see Figure 44).

As is frequently the case with the introduction of technology to a school or district, RITTI participants reported that specific individuals have made extraordinary efforts to realize a vision of computer use in their school. Nearly half of the respondents (46.2%) report that their school computer coordinator or media specialist was instrumental. Significantly, RITTI participants are as likely to cite themselves (43.3%) as they are a principal or school-level administrator (43.3%) as also making substantial contributions. Teachers (36.8%) and district-level technology coordinators (28.1%) were also recognized as playing an important role (see Figure 45).

Figure 38
Internet Connectivity



39

Sources

Figure 38
RITTI question 55; NCES (1996), p.7, Figure 3.

Figure 39
RITTI question 56; NCES (1996), p.5, Figure 1.

Figure 40
RITTI question 57; NCES (1996) p.8, Table 3.

Figure 41
RITTI question 11.

Figure 42
RITTI question 12.

Figure 43
RITTI question 58.

Figure 44
RITTI question 62.

Figure 39
Type of Internet Connection

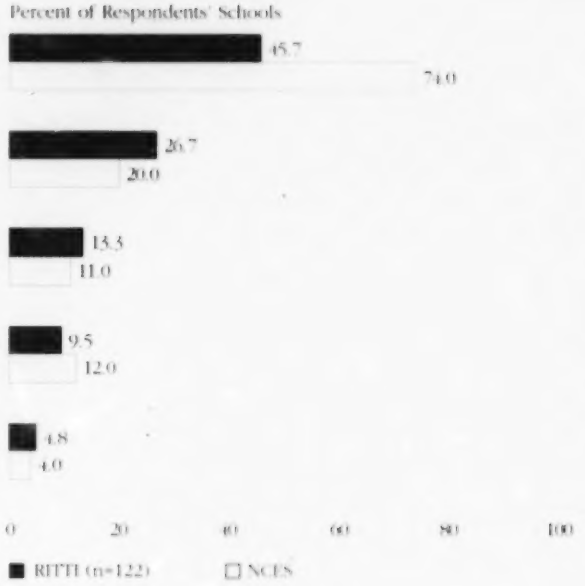


Figure 40
Availability of Internet Resources

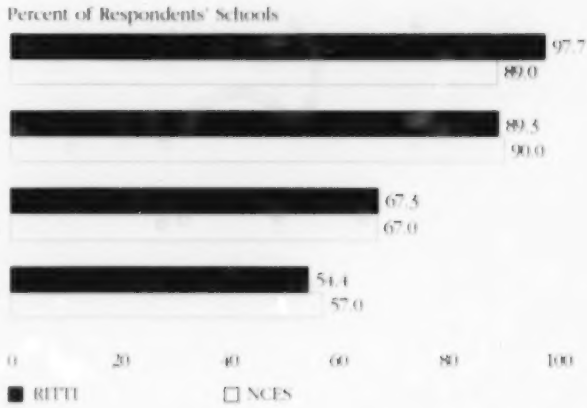
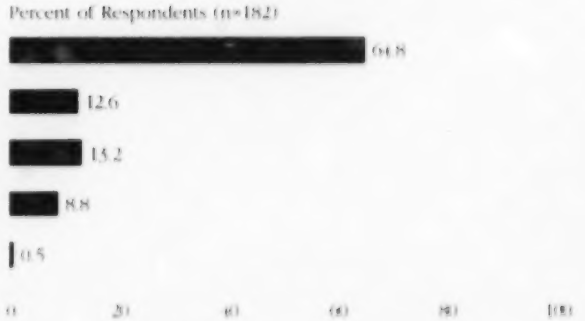


Figure 41
Frequency of Access to Computers for Class Preparation during the School Day
N.B. Does not include the laptop received from RITTI.



40

Figure 42
Frequency of Access to the Internet for Class Preparation during the School Day

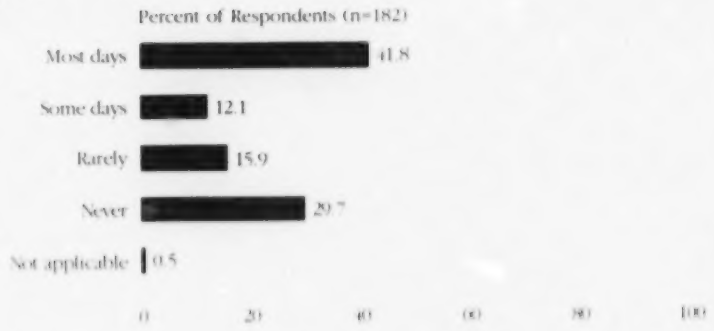
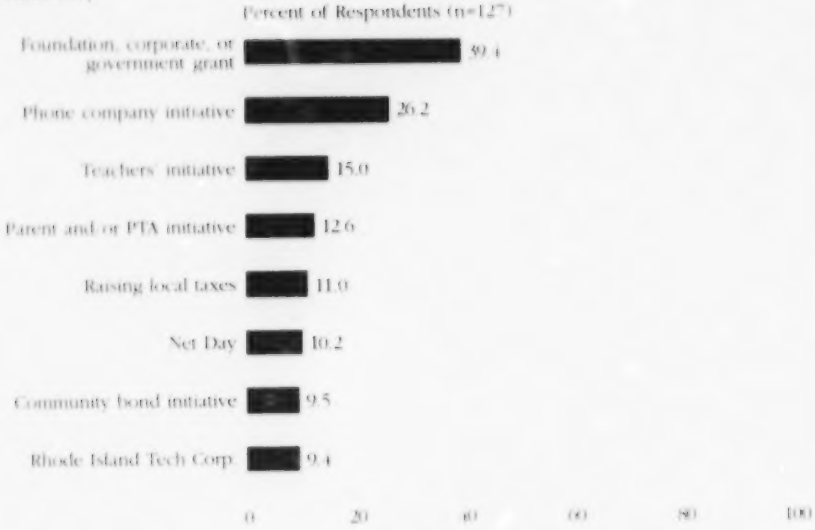


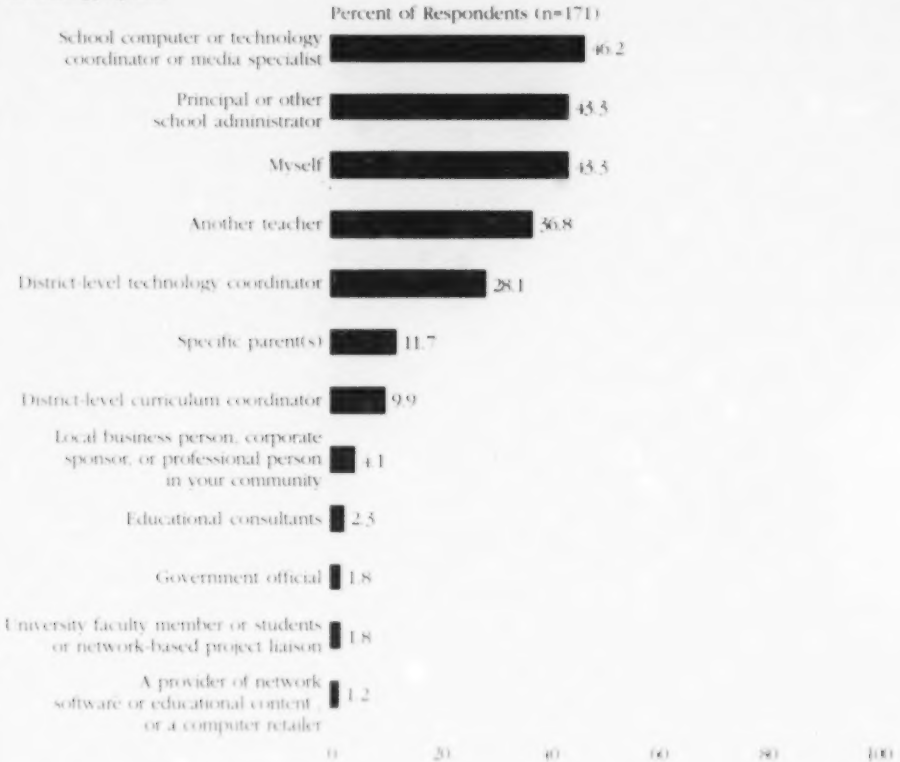
Figure 43
Funding Sources for Internet Connectivity



"This course has been wonderful!! I have gained so much.... The trainers and people connected with the program are fantastic.

41

Figure 44
Catalyst for Schools' Technology Agenda



42

CONCLUSION

This report summarizes the results from a survey of 183 public school educators who participated in the pilot implementation year of the Rhode Island Teachers and Technology Initiative. These educators represent 58% of the 314 teachers who received laptop computers and 60 hours of training as the initial RITTI cohort. The findings suggest that this initiative is having a substantial impact on the kinds of teaching and learning practices that educators are implementing in their schools. The program has also succeeded in its goal of empowering individual teachers by enabling them to take on leadership roles in their schools and districts. RITTI teachers have become advocates for the importance of technology in education.

The findings indicate that the experience of the RITTI population in using computers and telecommunications technologies varies significantly. Approximately one-third of the teachers are veteran technology users, having worked with computers for ten or more years. Another third are novice users, having become active only during the past two years. The program attracted a substantial number of new users—teachers who had no prior experience with technology before participating in RITTI. Nearly all of these teachers now use technology daily for both personal and professional reasons.

The data suggest that this group of educators is largely self-motivated when it comes to using technology for instructional and professional purposes. The majority of participants describe themselves as self-taught. However, there is also evidence that Rhode Island schools are increasingly providing professional development opportunities in the use of technology. Nearly two-thirds of all respondents report having taken courses offered by their districts.

There is also strong evidence that RITTI has succeeded in creating an atmosphere of collegiality, collaboration, and reflective practice among participants. Teachers are turning to each other for help and support; they are actively sharing their ideas and expertise with colleagues both within and outside their school communities; they are spending substantial amounts of time exchanging ideas over the Internet; and they believe themselves to be more reflective about their teaching goals and strategies.

The use of computers among this group of educators is also stimulating important changes in their pedagogical practices. Teachers are not only more comfortable receiving help from their students, but they are also creating learning situations in which students can assume more responsibility and initiative. These teachers no longer feel they must be both the container and dispenser of all classroom knowledge; they can facilitate peer-to-peer collaborations among students and support their students in self-directed learning experiences.

The program also appears to be having a substantial impact on students' learning. Students are more likely to be engaged in complex learning activities that involve identifying, interpreting, and synthesizing multiple sources of information. Although teachers do not perceive the program to have a direct impact on students' standardized test scores, they see students' motivation and confidence in their own abilities as on the rise.

Participants overwhelmingly agree that the RITTI training is the most valuable professional development experience they have ever participated in. RITTI teachers have acquired substantial expertise in using a range of technology tools, from word processors and spreadsheets to email and the World Wide Web. Most importantly, these educators have developed enormous confidence in their own technical skills and capabilities. For the majority of these educators the program has also helped to reinvigorate their commitment to the teaching profession.

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The Rhode Island Teachers and Technology Initiative has succeeded in building a community of practitioners who are working hard to reshape and transform teaching and learning practices in their schools. While the overall findings of this study speak to the largely beneficial and rewarding aspects of this technology and training initiative, a number of issues at the school, district, and state levels must be addressed if the program is to succeed in its goal of improving educational opportunities for all children in the state. We suggest that:

- Schools and districts must continue to invest in their technology infrastructures. Currently, there are too few computers and insufficient classroom access to the Internet to make technology an integral part of daily instructional practice.
- As is true with schools across the country, Rhode Island schools must address the issue of how to provide adequate technical support and maintenance for a growing number of technology resources.
- Schools and districts need to recognize their RITTI faculty and develop systematic strategies for acknowledging their accomplishments and enabling other teachers to learn from them.
- The State Department of Education needs to consider how technology-based units of practice can support their curriculum frameworks. A number of RITTI participants are well suited to assist the state in this regard.
- The University of Rhode Island is well positioned to take advantage of the veteran RITTI educators and partner them with teachers-in-training to develop a model teacher preparation program in technology, education, and school reform.

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